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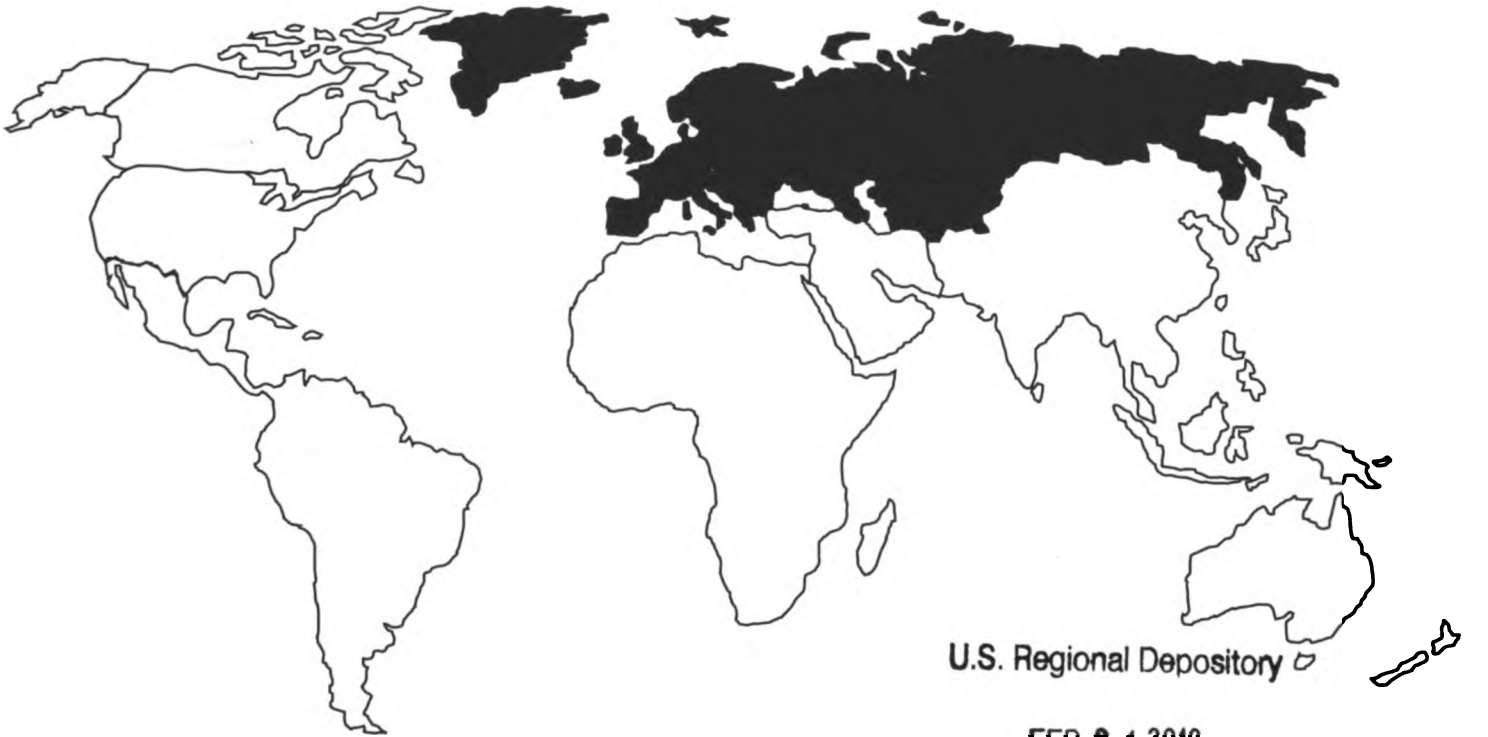
MINERALS YEARBOOK 2006

Area Reports: International 2006

Europe and Central Eurasia

Volume III



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MINERALS YEARBOOK

Area Reports: International 2006

Europe and Central Eurasia

Volume III

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U.S. DEPARTMENT OF THE INTERIOR
KEN SALAZAR, Secretary

U.S. GEOLOGICAL SURVEY
Marcia K. McNutt, Director

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Foreword

This edition of the U.S. Geological Survey (USGS) Minerals Yearbook discusses the performance of the worldwide minerals and materials industries during 2006 and provides background information to assist in interpreting that performance. Content of the individual Minerals Yearbook volumes follows:

- Volume I, Metals and Minerals, contains chapters about virtually all metallic and industrial mineral commodities important to the U.S. economy. Chapters on survey methods, summary statistics for domestic nonfuel minerals, and trends in mining and quarrying in the metals and industrial mineral industries in the United States are also included.
- Volume II, Area Reports: Domestic, contains a chapter on the mineral industry of each of the 50 States and Puerto Rico and the Administered Islands. This volume also has chapters on survey methods and summary statistics of domestic nonfuel minerals.
- Volume III, Area Reports: International, is published as four separate reports. These regional reports contain the latest available minerals data on more than 190 foreign countries and discuss the importance of minerals to the economies of these nations and the United States. Each report begins with an overview of the region's mineral industries during the year. It continues with individual country chapters that examine the mining, refining, processing, and use of minerals in each country of the region and how each country's mineral industry relates to U.S. industry. Most chapters include production tables and industry structure tables, information about Government policies and programs that affect the country's mineral industry, and an outlook section.

The USGS continually strives to improve the value of its publications to users. Constructive comments and suggestions by readers of the Minerals Yearbook are welcomed.

Marcia K. McNutt, Director

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Contacts

Information about the U.S. Geological Survey, its programs, staff, and products may be accessed on the World Wide Web at http://www.usgs.gov or by contacting the Earth Science Information Center at 1-888-ASK-USGS. For specific information about this publication, contact the Chief, International Minerals Section, Minerals Information Team, at (703) 648-7732, or the Team secretary at (703) 648-4961. Additional minerals information may be accessed on the World Wide Web at http://minerals.usgs.gov/minerals.

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Acknowledgments

The Country Specialists in the Minerals Information Team, U.S. Geological Survey, in preparing the International Review regional books of volume III of the Minerals Yearbook, extensively use statistics and data on mineral production, consumption, and trade provided by various foreign Government minerals and statistical agencies through various official publications. The cooperation and assistance of these organizations are gratefully acknowledged. Statistical and informational material was also obtained from reports of the U.S. Department of State, United Nations publications, and the domestic and foreign technical and trade press. Of particular assistance were reports submitted by the Resource Reporting Officers and other officers of the Department of State in U.S. Embassies worldwide. Their contributions are sincerely appreciated. Internal statistical support was provided by the staff of the Data Collection and Coordination Section of the Minerals Information Team.

The regimes of some countries reviewed in this volume may not be recognized by the U.S. Government. The information contained herein is technical and statistical in nature and is not to be construed as conflicting with or being contradictory of U.S. foreign policy.

John H. DeYoung, Jr.
Chief Scientist, Minerals Information Team

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The Mineral Industries of Europe and Central Eurasia

By Richard M. Levine, Walter G. Steblez,[1] Steven T. Anderson, David R. Wilburn, Harold R. Newman, and Glenn J. Wallace

The area of Europe and Central Eurasia treated in this volume encompasses territory that extends from the Atlantic coast of Europe to the Pacific coast of the Russian Federation and includes the British Isles and Iceland. Greenland, which is located in the northwestern Atlantic Ocean, and the Kurile Islands and the Sakhalin, which are located off the Sea of Japan in the Pacific Ocean and which are political extensions of Denmark and the Russian Federation, respectively, are also treated in this volume.

Economic integration in Western Europe evolved into the formation of the European Union (EU), which is a supranational entity that at yearend 2006 comprised Austria, Belgium, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom. [A very much diminished European Free Trade Area (EFTA), which comprised Iceland, Liechtenstein, Norway, and Switzerland, served as an alternative entity to the EU in Western Europe.]

The admission of new member countries has been one of the significant political programs of the EU. To gain membership, applying countries must fulfill political and economic requirements, such as achieve stability of the institutions that guarantee democracy, the rule of law, human rights, and respect for and protection of minorities; have a functioning market economy and the capacity to cope with competitive pressure and market forces within the EU; and be able to take on the obligations of EU membership, including adherence to the aims of political, economic, and monetary union.

In 2006, in the former centrally planned economy areas, the countries of Central Europe (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Hungary, Macedonia, Montenegro, Poland, Serbia, Slovakia, and Slovenia) and the Baltic countries (Estonia, Latvia, and Lithuania) had completed the successful transition from authoritarian Governments with central economic planning to open political systems with market-based economies. The transition among the countries of the Commonwealth of Independent States (CIS) (Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan) was less complete, with some of these countries having made little progress, although others had taken significant steps towards the establishment of open political systems and market-based economies.

In 2006, the EU agreed to the accession of Bulgaria and Romania to the EU in January 2007, and Croatia, the Former Yugoslav Republic of Macedonia, and Turkey had official candidate status. Other countries in the Balkans were in more preliminary stages of negotiation for accession. The EU also promoted economic development in such CIS countries as Ukraine through its European Neighborhood Policy (ENP) (Commission of the European Communities, 2006b, p. 2-5; 2006c).

In 2006, the population of the EU exceeded that of the United States by about 1.5 times, and its total gross domestic product (GDP) based on purchasing power parity approximately equaled that of the United States (tables 1, 2).

A major function of the EU has been to remove barriers to trade in an attempt to create a single market and to develop a common set of economic policies. Although all EU members must adhere to the EU's environmental and commercial standards, no common policy was in place regarding the mineral extractive industries specifically. The mineral industries of the EU10 countries (Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia) plus Bulgaria and Romania (in 2007) were expected to increase both employment in and production of the mineral industry of the EU, and the production of industrial minerals and mineral fuels was expected to play a greater role in the expanding EU economy (Commission of the European Communities, 2006a, p. 60).

The CIS was founded in 1991 by several republics of the former Soviet Union (FSU) and later was extended to include all the former Soviet republics except the Baltic states of Estonia, Latvia, and Lithuania. In the adopted Declaration, the participants of the Commonwealth declared their interaction to be based on the principle of the sovereign equality of all members and that the member states were independent and equal subjects of international law. The CIS is not a state and it does not have supranational powers. In 2006, the members of the CIS were Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan. Turkmenistan discontinued permanent membership as of August 26, 2005, and became an associate member. Turkmenistan, however, was establishing closer cooperation with the CIS following the death of its President in December 2006 and the installation of a new President.

In September 1993, the Governments of the CIS states signed an agreement on the creation of an economic union that would form a common economic space based on the free movement of goods, services, labor, and capital and: the union would work to coordinate monetary, tax, price, customs, and external economic policy; develop methods of regulating economic activity; and create favorable conditions for the development of direct production relations. Integration of the countries of the CIS was executed through its coordinating institutions (charter bodies, executive bodies, and the bodies of branch cooperation of the CIS). In 1997, an agreement was signed by members of the CIS

[1]Deceased.

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to cooperate in the areas of science, exploration, and the use of mineral resources, with the goal of establishing international cooperation in the use of the economic and technical resources of the CIS states. The signers would reestablish ties among the mineral industries of the CIS states that had been broken with the dissolution of the Soviet Union. The Executive Committee of the CIS with the participation of leading scientists and specialists, prepared a Mining Charter and an Agreement on Cooperation for the study, exploration, and use of the mineral resources of the CIS states. The agreement was signed on March 27, 1997, by Armenia, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, and Ukraine. On the basis of this agreement, an Inter-Governmental Council was formed to fulfill the mission of the agreement.

An important step taken by the Inter-Governmental Council was an agreement signed in Minsk, Belarus, on May 30, 2001, to settle disputes regarding mineral development in border areas, to implement environmental measures to protect the population of the neighboring states when developing mineral resources, and to specify conditions for cooperation between neighboring CIS states in mineral development. One of the basic documents regulating these matters was a Model Law Code regarding the Earth's resources and their use signed by the Inter-Parliamentary Assembly of the CIS countries in 2002; the Model Law Code deals with a wide range of issues regarding minerals and mineral development. By 2006, the Inter-Governmental Council was coordinating more than 10 joint programs and projects relating to scientific and technical cooperation, harmonizing laws about the use of resources, and engaging in information exchanges.

Acknowledgments

The U.S. Geological Survey (USGS) acknowledges and thanks the following foreign Government agencies, international institutions, and private research organizations for providing mineral-production statistics, basic economic data, and other mineral-related information:

- Albania—INSTAT (Institute of Statistics);
- Armenia—National Statistical Service;
- Azerbaijan—State Statistical Committee of Azerbaijan Republic;
- Belarus—Ministry of Statistics and Analysis of the Republic of Belarus;
- Croatia—Statistical Information and Documentation Division;
- Czech Republic—Czech Geological Survey, Ministry of Industry and Trade;
- Denmark—Danmark og Gronlands Geologisk Undersogelse [Geological Survey of Denmark and Greenland];
- Estonia—Geological Survey of Estonia;
- Finland—Statistics Finland;
- Germany—Bundesanstalt fuer Geowissenschaften und Rohstoffe [Federal Institute for Geological Sciences and Raw Materials];
- Hungary—Magyar Köztársaság Gazdasági Ès Közlekedési Minisztérium Magyar Geológiai Szogálat [Hungarian Geological Survey];
- Iceland—Statistics Iceland;
- Ireland—Geological Survey of Ireland;
- Kazakhstan—Agency on Statistics;
- Kyrgyzstan—Ministry of Foreign Affairs;
- Lithuania—Industrial Statistics Division;
- Luxembourg—Central Statistical Service;
- Poland—Central Statistical Office;
- Portugal—IGM–Division de Statistical Studies;
- Romania—National Institute of Statistics;
- Slovakia—Statistical Office;
- Slovenia—Slovenian Government;
- Ukraine—State Statistics Committee; and
- United Kingdom—British Geological Survey.

General Economic Conditions

The countries of the EU and the CIS were substantial participants in the world mineral economy and occupy important roles as suppliers and consumers of all major mineral commodities. In 2006, the EU continued to be a major world processing and consuming region and its role in the world mineral industry continued to be one of processing and consuming rather than mining. Central Eurasia remained a major world supplier of mined and processed minerals. Its consumption of these commodities, although at a low level compared with that of the EU, was increasing. As mineral consumption in Central Eurasia increases, more mineral production from this part of the world is likely to be consumed domestically and result in the Central Eurasian countries reducing mineral exports to world markets unless there is a commensurate increase in production. The unaffiliated countries of the Balkans played a much lesser role in both the supply and consumption of most mineral commodities.

As a major world mineral processing and consuming area, the EU remained a significant determinant of world demand for all mineral commodities. With the near exhaustion of much of its mineral reserves and the decline in its role as a world mine producer of minerals, the EU continued to produce metals, which included aluminum, copper, lead, steel, and zinc, using largely imported raw materials and secondary materials; its mineral processing and manufacturing industries accounted for a significant share of the world production of semimanufactured and fabricated ferrous and nonferrous metals. Germany remained the EU's dominant smelter and refiner of most metals. The EU was a major manufacturing center and its industries were large consumers of metal products used to produce industrial and consumer goods. With a high per capita income and standard of living, the EU was one of the world's major consumers of mineral fuels and of mineral products in consumer goods.

Despite the diminution of Western Europe's importance as a mining region, Western Europe was an important world financial center and the headquarters of such major transnational mining and mineral processing companies as United Kingdom-based Anglo American plc, BHP Billiton plc, and Rio Tinto plc. Also, Western Europe played a significant global role in the extraction and processing of certain industrial minerals and mineral fuels. Significant petroleum and natural gas resources had been developed in the North Sea, and there were also significant coal

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reserves. Germany remained an important mine producer of a number of industrial minerals and coal.

Some metals were mined in the EU (mainly iron ore and copper), but mine production of metals was not globally significant. The key issues for the EU regarding minerals were the need to secure adequate supplies of mineral fuels to supply its energy requirements, the need to secure supplies of metallic mineral raw materials (such as concentrates, ores, and scrap) for its metal refining and processing industries, and the need to supply its manufacturing and construction industries and agriculture with metals and industrial minerals.

The accession of Poland to the EU, in particular, increased the EU's capacity to mine coal and copper, lead-zinc ore, salt, and sulfur, and to produce steel. The metal processing sectors of the EU, however, remained heavily dependent upon imports of mineral materials. The EU still mined and quarried such industrial minerals as feldspar, kaolin, marble, potash, salt, and sand and remained among the world's leading producers of feldspar, kaolin, and natural stone.

In the CIS, Kazakhstan, Russia, and Ukraine were the main mineral producing countries. Russia, which occupied about 75% of the territory of the CIS, was by far the largest country in the CIS in both population and territory and had the leading mineral producing sector. Azerbaijan, Kyrgyzstan, Uzbekistan, and several other CIS countries also were important producers and processors of minerals. In 2006, Russia ranked among the leading world producers or was a large producer of such mineral commodities as aluminum, arsenic, asbestos, bauxite, boron, cadmium, cement, coal, cobalt, copper, diamond, fluorspar, gold, iron ore, lime, lithium, magnesium compound and metals, mica (scrap sheet and flake), natural gas, nickel, nitrogen, oil shale, peat, petroleum, phosphate, pig iron, platinum-group metals (PGM), potash, rhenium, silicon, sulfur, steel, tin, titanium sponge, tungsten, and vanadium.

Kazakhstan was a significant producer of such mineral products as arsenic, barite, beryllium metal, bismuth, cadmium, chromite, copper, ferroalloys, lead, titanium sponge, uranium, and zinc. Ukraine was a significant producer of such mineral products as ferroalloys, iron ore, manganese ore, pig iron, steel, and titanium raw materials. Other CIS countries were significant world producers of one or more mineral commodities, including Armenia (molybdenum), Azerbaijan (oil), Belarus (potash), Kyrgyzstan (antimony metal, gold, and mercury ore and metal), Tajikistan (aluminum), Turkmenistan (natural gas), and Uzbekistan (gold and uranium), and all the CIS countries produced a range of other mineral commodities.

Kazakhstan is the largest country in terms of land area in Central Asia and one of the most sparsely populated in the world. The country has considerable mineral resources and vast areas of arable land. Oil production is expected to continue to be the major activity driving the economy of Kazakhstan, and oil production is likely to double by 2010. In 2006, as a percentage of the country's total volume of exports, hydrocarbons constituted 65%, and ores and metals, 14%. Kazakhstan was sending 100% of its gas exports and 90% of its oil exports on routes through Russia. Discussions were underway concerning Kazakhstan diversifying its fuel export routes. The vast majority of Kazakhstan's metal output was exported. China was playing an increasing role as a recipient of Kazakhstan's metal exports. Kazakhmys, the country's major copper producer, exported 85% of its cathodes and rods to China. In 2006, Kazakhstan concluded an agreement with China by which Kazakhstan's iron ore exports to China increased by 83%.

The mineral raw material sector in Russia produced about 30% of the country's GDP and contributed about 70% of the country's budget revenues. Analyses from the International Monetary Fund and the World Bank have estimated that the oil and gas sector accounted for about 20% of the country's GDP, although it employed less than 1% of Russia's workforce. The metallurgical sector accounted for about 5% of the GDP, 18% of industrial production, and 15% of exports.

In 2006, Russia's exports of mineral products were valued at $199 billion, of which $178.7 billion was exported outside the CIS; mineral products accounted for 65.8% of the country's total value of exports and 68.7% of the total value of exports outside the CIS. Exports in 2006 were valued significantly more than in 2005, when exports of mineral products were valued at $156 billion and exports outside the CIS were valued at $140.9 billion; mineral products in 2005 accounted for 64.6% of total exports and 67.5% of exports outside the CIS. Oil and gas exports accounted for more than 60% of export revenues. Russia's exports of natural gas and oil and of ferrous and nonferrous metals accounted for between 7% and 20% of the total volume of world exports of these products.

Russia's exports of ferrous and nonferrous metals ranked second to mineral fuels in the country's total value of exports and accounted for 15% of the total value of exports. In 2006, however, the total value of ferrous and nonferrous metals as a percentage of the country's total exports decreased somewhat compared with that of 2005. In 2006, Russian metal exporters continued to face trade sanctions, with more than 38 trade sanctions still in place in such countries as Argentina, Australia, countries of the EU, India, Mexico, Turkey, the United Arab Republic, the United States, and Venezuela. Such restrictions were affecting both ferrous and nonferrous metal exports. In 2006, Russia still had not achieved acceptance to the World Trade Organization; if such membership were achieved, a number of the trade barriers that were erected against Russian metal exports could be removed.

In 2006, Russian exports of ferrous metals totaled 45.96 million metric tons (Mt) and were valued at $17.85 billion. In the ferrous metals sector in 2006, Russia exported 22.9 Mt of iron ore and concentrate, which was a 25.8% increase compared with exports in 2005; 6.1 Mt of pig iron, which was a 15.3% increase; and 19.889 Mt of steel products, which was about a 1% increase. In the nonferrous metals sector, Russia increased its aluminum exports by 10.1% to 4.064 Mt, but copper exports decreased by 12.9% to 271,000 t and nickel exports decreased by less than 1% to 259,800 t. In the mineral fuels sector, Russia exported 91.4 Mt of hard coal, which was a 14.5% increase compared with that of 2005; 248 Mt of crude oil, which was about a 2% decrease; 103 Mt of refinery products, which was a 6% increase; and 203 billion cubic meters of natural gas, which was a 2.4% decrease.

Only a small percentage of Russian exports of mineral products went to countries of the CIS. The leading consumer of

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Russian energy products was the EU, which received 63% of Russia's total oil exports and 65% of its gas exports. Russia was the EU's leading supplier of oil and gas and provided 27% of total EU oil imports and 44% of total EU natural gas imports.

Ukraine's steel industry was a mainstay of its economy and a major source of export revenues. The country's steel industry accounted for between 5% and 6% of the GDP and 34% of export revenues. It employed about 420,000 people, which constituted about 10% of industrial employment and about 2% of total employment. Ukraine was among the world's three leading steel exporting countries and its net exports in 2006 totaled 27.8 Mt.

Ukraine's dramatic growth since 2000 had been fueled in part by improved terms of trade created by rising metal prices. Strong demand for steel products globally had helped fuel Ukraine's economy, as Ukrainian steel producers were among world's lowest cost producers. Ukraine's steel industry in the beginning of 2006 was experiencing difficulties caused by the weather, a shortage of natural gas, and a weak international market. After the first quarter of the year, however, conditions improved as supplies of iron ore and scrap increased, as did that of natural gas; the world market demand for steel also increased, as did the price.

A large amount of oil and natural gas destined for the EU and southeastern Europe was transited through Ukraine, including about 23% of the EU's oil imports and 46% of the EU's gas imports. Tensions arose between Russia and Ukraine when Russia decided to charge Ukraine the world market rate for the gas it consumed rather than the lower rate it had been charging. In early 2006, Russia began to increase natural gas prices for Ukraine toward prices charged in Western Europe. Ukraine claimed that the proposed almost fourfold price increase was politically motivated because of the "Orange Revolution" that had occurred in Ukraine and the country's election of a President perceived to be more politically oriented towards the West than towards Russia. Russia began cutting gas supplies to Ukraine in an energy price dispute that became a major political dispute. This crisis created fears that Russian exports to Western Europe could be affected, as most of the gas from Russia destined for Europe was channeled through Ukrainian pipelines and Ukraine was capable of diverting these supplies for its own needs. Russia insisted that there would be no disruption of supplies to Europe. An agreement reached between Russia and Ukraine set the gas import price at $95 per thousand cubic meters, which was a 64% increase from the previously prevailing price.

Similar issues also arose in Belarus when Russia decided to raise the price of gas it charged Belarus closer to the price it charged European countries. The decision was explained by Russia as an economic decision but was regarded by Belarus as a form of political pressure. Belarus had threatened to retaliate by interrupting Russian gas crossing the country on its way to Western Europe, which echoed similar issues in Russia's dispute with Ukraine.

Exploration

Based on data provided by the Metals Economics Group (MEG), exploration budgets for Europe and Central Eurasia increased in 2006 to about an estimated $784 million from the 2005 estimate of about $528 million (Cox and Goulden, 2005; Metals Economics Group, 2006). According to the MEG survey, exploration activity in this region increased by 49% compared with estimates for 2005. This increase resulted from an increase in reported Russian exploration activity, as well as continued interest in the Carpathian Arc (including Eastern Europe and western Turkey), Scandinavia (particularly Finland and Sweden), and Central Eurasia.

Based on exploration site data collected by the USGS, exploration activity in the CIS focused on gold (60%), copper (18%), and nickel (8%) projects. European mineral exploration focused on gold (57%) and base metals. Many former mining areas of Europe were being reevaluated with newer geophysical methods; areas rich in base-metal sulfides, for example, were being reevaluated for PGM potential.

Exploration activity in the CIS was greatest in Kazakhstan, Kyrgyzstan, and Russia primarily and was focused on the search for gold, base metals, and diamond. Russian gold deposits typically have a larger tonnage of resources than the world average, but generally have lower grades and require more-expensive processing because of a greater frequency of hard refractory ore (Leskov, 2004). Detailed historical data on many sites collected under the Russian system are often available, but differences in resource nomenclature and data classification confusion add to the difficulty in assessment by foreign companies. It was reported that the Russian President ordered the declassification of data related to diamond and gold; however, the declassification procedures could reportedly take several years (Mining Magazine, 2006). As the next step in freeing up data on diamond and PGMs, Russia's President signed a decree abolishing export quotas for these minerals on January 13, 2007 (Helmer, 2007).

As part of its resource development strategy, the Russian Government was in the process of developing a list of areas of the economy that would be closed to foreign- dominated ownership, and this list included development of large mineral deposits. The former law of 1992 did not impose any special restrictions on companies with foreign participation, with the exception of diamond and radioactive materials. Proposed amendments to Russia's law on the use of subsurface resources were ratified on January 31, 2007. These amendments set criteria for strategic deposits that limited the rights of foreigners to invest in a controlling stake in strategic deposits that had not yet been developed with foreign participation. Strategic deposits included oilfields with more than 70 Mt of reserves, natural gas fields with more than 50 billion cubic meters of reserves, copper deposits with more than 500,000 t of copper contained in the ore, and gold fields with more than 50 t of gold contained in the ore. All mineral deposits of diamond, pure quartz, and uranium were considered strategic. These new amendments set criteria for strategic deposits that were lower for oilfields and gasfields than criteria proposed earlier and would encompass therefore a larger number of these fields, which would number about 30 oilfields and 40 gasfields. Three copper deposits would be listed as strategic, including the large Udokan copper deposit. The large Sukhoy Log gold deposit would be among the gold deposits listed.

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Commodity Overview

This report includes commodity outlook tables. Estimates for production of major mineral commodities for 2007 and beyond have been based upon such factors as announced plans for increased production/new capacity construction and bankable feasibility studies. The outlook tables in this summary chapter show historic and projected production trends; therefore, no indication is made about whether the data are estimated or reported and revisions are not identified. Data on individual mineral commodities in tables in the individual country chapters are labeled to indicate estimates and revisions. The outlook segments of the mineral commodity tables are based on projected trends that could affect current producing facilities and on planned new facilities that operating companies, consortia, or Governments have projected to come online within indicated timeframes. Forward-looking information, which includes estimates of future exploration, mine development and production, cost of capital projects, and timing of the start of operations, are subject to a variety of risks and uncertainties that could cause actual events or results to differ significantly from expected outcomes. Projects listed in the following section are presented as an indication of industry plans and are not a USGS prediction of what will occur.

Metals

Bauxite and Alumina and Aluminum.—In Europe and Central Eurasia, Europe (excluding the CIS) was the main primary aluminum-producing region; its output accounted for about 15% of the world's primary aluminum output. Europe (excluding the CIS) also was the world's leading producer of secondary aluminum (about 40% of total world output). Aluminum production in Europe was projected to increase slightly. The CIS' production of primary aluminum (12.5% of the world total) was somewhat less than that of the rest of Europe's, but the CIS was projected to overtake production in Europe. Data on secondary aluminum production in Central Eurasia was lacking and, therefore, the region appeared to far behind that of Europe in the production of secondary aluminum; a definitive comparison cannot be made because of the lack of data. Central Eurasia was by far the region's leading producer of bauxite although its production was not on a scale of the world's leading producers.

Russia was the world's second ranked producer of aluminum after China. A steady increase of Russia's substantial aluminum smelting capacity was projected, thereby contributing to Central Eurasia's positive outlook for aluminum production. RUSAL was Russia's leading domestic aluminum producing company and SUAL was the second ranked domestic aluminum producer and the leading domestic bauxite producer. Together, these two firms controlled all Russian aluminum, alumina, and bauxite production enterprises. Plans called for RUSAL to merge with SUAL and with the Switzerland-based Glencore International AG to become United Company RUSAL, which would then become the global leader in aluminum production. The merger was completed in March 2007.

In 2006, RUSAL was investing to expand and modernize its production facilities. It was engaged in commissioning the Khakas aluminum smelter with a capacity of 300,000 metric tons per year (t/yr). The Khakas aluminum smelter was the first aluminum production facility built in Russia in the past 20 years, and the first batch of aluminum was smelted at Khakas in December 2006. The Khakas smelter was projected to reach its installed capacity in October 2007. In 2006, RUSAL began work to construct a 750,000-t/yr greenfield aluminium smelter in Taishet, which is a small town located near Irkutsk. The construction was expected to be completed in 2011. RUSAL also was carrying out large-scale modernization of the Irkutsk aluminum smelter, which was commissioned in 1962, that would enable the smelter to increase its production capacity o 500,000 t/yr from 300,000 t/yr t. Plans for RUSAL also called for modernizing the Nikolayev alumina refinery in Ukraine to increase output to 1.6 million metric tons per year (Mt/yr) of alumina from 1.4 Mt/yr.

The major aluminum industry development project in Russia was the Komi Aluminum project, which was initiated by SUAL. The project entailed the development, construction, and operation of a bauxite-alumina complex in the Komi Republic, based on the Middle Timan bauxite deposit. The design capacity of the complex was 6.5 Mt/yr of bauxite and 1.4 Mt/yr of alumina. Plans called for increasing bauxite production at Komi to 6.5 Mt/yr in the 2009-10 period. Construction of the project's alumina plant in Sosnogorsk had not begun, and its functioning would depend on its obtaining an uninterrupted supply of bauxite from the Komi project to achieve its design capacity. The completion of the Komi project would considerably reduce the Russian aluminum industry's dependence on foreign countries for bauxite and alumina.

Copper.—In 2006, Central Europe (mainly Poland) and Central Eurasia (Kazakhstan and Russia) were the chief areas of copper mine production in the region. Although Western Europe was only a minor mine producer of copper, it produced a significant share of total world output of primary and secondary refined copper. Germany was the leading producer of refined copper in Western Europe and the second in the region following Russia. Belgium, Spain, and Sweden, in that order, followed Germany as Western Europe's next ranked refined copper producers.

Central Eurasia followed Western Europe as a producer of refined copper, and Central Europe produced less than one-half the amount of refined copper as Central Eurasia. Russia remained the major producer of refined copper in Central Eurasia. Kazakhstan was also a major producer but had less than one-half the production of Russia. In Central Europe, Poland remained the main producer of refined copper, with output about 37% above that of Kazakhstan but significantly below that of Russia.

Development and expansion of mine production of copper in Europe and Central Eurasia, in conjunction with reported ongoing and planned mine closures, could result in a net increase of copper mine production of about 530,000 t by 2013 (table 7). Kazakhstan and Russia appeared to be the countries where the most significant growth in the volume of production was likely to take place in both mine output and refined copper production.

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All copper ore in Poland was mined by Kombinat Gorniczo Hutniczy Miedzi (KGHM) Polska Miedz S.A. (KGHM S.A.), which was a major world copper mining, beneficiation, smelting, and refining complex located in the Lubin area. KGHM S.A. accounted for almost 4% of world mine copper production in 2006. The Rudna Mine was the leading copper ore producer with a mining capacity of about 11 Mt/yr. Poland's copper reserves were projected to be depleted by 2040 (Ney and Smakowski, 2004). Poland's future mine output of copper may depend not only on the country being able to access new and environmentally tenable domestic copper deposits, but also on the country's ability to assure future supplies of copper ore and concentrate from investments in the Democratic Republic of the Congo [Congo (Kinshasa)], in Peru (Rio Blanco copper project), and the Philippines.

In 2006, Poland and Russia ranked among the top 10 copper-ore-mining countries in the world (Edelstein, 2007). Russia's leading copper producing enterprise, MMC Noril'sk Nickel, produced almost 60% of Russia's copper in ore output. The remaining ore came from mining in the Urals. About 29% of Russia's copper metal production was from secondary material. As nickel-rich ores at Noril'sk become depleted, Noril'sk planned to switch to mining larger quantities of ores, which would be primarily copper-rich ores that have a higher copper content relative to their nickel content than the nickel-rich ores, but are lower in metal content for both metals. This would increase copper output as Noril'sk tries to maintain its level of nickel production. Noril'sk's strategy up to 2010, however, appeared to be to maintain its production of nickel-rich ores, which would delay any significant increase in copper production.

The leading copper producer in the Urals was the Urals Mining and Metallurgical Company (UMMC). UMMC consisted of about 40 enterprises in 11 regions managed by UMMC Holding and the company had about a 40% share of the domestic copper cathode market. In 2006, UMMC produced 354,258 t of cathode copper, which was about equal to its 2005 production level, and it planned to increase production in 2010 by 41% compared with that of 2006 to 500,000 t. In 2006, UMMC had the capacity to produce 360,000 t/yr of copper.

The Russian Copper Company (RCC), which was the country's third ranked copper producer and which had production facilities centered in the Ural Mountains, increased production of copper cathode in 2006 by 33% compared with that of 2005 to 164,000 t. The RCC consisted of 11 upstream and downstream enterprises that mined and processed copper and produced copper products. In 2006, RCC's share of the Russian market rose 3% to 18% and its share of the world market was 1%. RCC's copper cathode production capacity increased by 60,000 t/yr in 2006, and RCC planned to increase copper cathode output to 290,000 t in 2010.

A reevaluation of reserves was occurring for the Udokan copper deposit in Chita oblast', which is one of the largest copper deposits in the FSU. The reevaluation was scheduled to be completed at the end of 2009. Owing to the size of its reserves, Udokan was being classified as a strategic deposit, which means that foreign companies would not be able to have a controlling interest in the ownership of the deposit.

Kazakhmys, the firm that controlled almost all copper mining and metal production in Kazakhstan, was engaged in a number of projects to ensure growth in the short term and provide for production replacement in the longer term. The majority of these projects were expected to begin production in the near or medium term and included both new mine development and the expansion of existing mines. The new mines included the Artemovskoye, which had already been completed ahead of schedule and had the capacity to produce 28,000 t/yr of copper and 98,000 t/yr of zinc; the Zhaman-Aybat, which was under construction and had reserves of 75.3 Mt of ore containing 1.069 Mt of copper; and the Aktogay, a site that was being evaluated for development of an open pit to mine that has a total of 1.614 billion metric tons (Gt) of ore with an average grade of 0.36% copper and which contain 5.810 Mt of copper. Expansion of existing mines was planned at the East Saryoba underground mine and at the Akbasau, the Kosmurun, and the Taksura open pits.

Gold.—In 2006, Central Eurasia remained the dominant gold producing area within Europe and Central Eurasia, accounting for more than 90% of the region's total output of gold. Central Eurasia's output was projected to increase through 2013. In 2006, in Central Eurasia, Russia, Uzbekistan, Kazakhstan, and Kyrgyzstan, in that order, were the leading gold producers. Russia was expected to continue to be the region's main gold producing area through 2013. Russia has large quantities of undeveloped reserves with which it could increase output. In the rest of the region, Romania appeared poised to become a significant gold producer with the development of the Rosia Montana deposit by Gabriel Resources Ltd. of Canada, which at full capacity could produce as much as 15.6 t/yr.

In 2006, gold output in Russia, including secondary production, decreased by about 2.2% to 164.231 t from 168.070 t in 2005. Gold mine output, which decreased to 159.340 t in 2006 from 163.186 t in 2005, was reduced mainly because of a decline in placer gold production of 9.6 t. Reserves at placer deposits were being depleted and production capacity was being transferred to mine hard rock deposits. Depletion of reserves at placer mines was attributed in part to a lack of resources by the small companies mining these deposits to invest in conducting necessary exploration. In 2006, 62 t was produced from placer deposits, which was far less than the amount produced from placers between 1976 and 1990 when production ranged between 110 and 130 t/yr. The total increase in extraction from hard rock mining enterprises in 2006 was 2.6 t as production increases at some enterprises were offset by decreases at others. Extraction of gold by foreign-controlled enterprises decreased by 10% in 2006.

In 2006, Kyrgyzstan's experienced a 36% decline in gold production to 10.721 t. Gold was the country's main mineral commodity produced, in terms of value. Plans had called for producing 12.795 t. The Kumtor Gold Company, which was the country's leading gold producer, reduced output by 39.5% to 9.443 t, which was 16.1% less output than planned. The decline in gold production at Kumtor was caused mainly by a pit wall slide in July but was also the result of the company having to mine lower-grade ore; the ore graded 1.5 grams per metric ton (g/t) gold compared with the higher-grade ore previously mined, which graded at 2.5 g/t gold. In 2007, plans called for Kumtor to increase gold production to 15 t.

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The Zarafshan-Newmont joint venture between Newmont Mining Corp. of the United States and Uzbekistan Government entities recycled tailings at the Muruntau gold lode in Uzbekistan. The processing plant was officially opened on May 25, 1995. The joint venture initially contracted to process 220 Mt of ore that had an average grade of 1.23 g/t gold and that contained 5.1 million troy ounces (158.63 t) of recoverable gold. The joint venture produced 7.192 t of gold in 2006, which was a decrease from the 7.714 t produced in 2005 and the 12 t produced in 2004. In June, Uzbekistan's courts ordered Zarafshan-Newmont to pay $48 million in back taxes, froze the joint venture's assets, and seized some of its gold. On August 11, the Government of Uzbekistan launched a criminal investigation against the joint venture and its employees and blocked the export of any gold. Newmont lost control over day-to-day operations of the joint venture. In September, Newmont wrote off the value of its stake in the joint venture after authorities seized gold and other assets based on two tax claims for payments due between 2002 and 2005. An Uzbekistan court seized $49 million for the disputed tax claims and declared the joint venture bankrupt. However, Newmont was still pursuing a settlement in 2006. It reached an agreement in 2007 whereby it agreed to transfer its stake in the Zarafshan-Newmont venture to Uzbekistan with none of the parties admitting liability regarding any matters in the dispute. According to the agreement, Newmont received $80 million for its 50% stake, which reportedly was less than its estimated book value. The enterprise will continue to process tailings from Muruntau.

Iron and Steel.—The level of steel production in the region was not expected to change appreciably through 2013, with some anticipated growth in steel production in Central Europe and Central Eurasia and relatively stable levels of production in Western Europe.

With respect to the steel industry in 2006, the EU was primarily concerned about the competitiveness and the level of privatization of crude steel production capacities in the new member countries, as well as those in prospective member countries. To approximate the EU's average level of productivity, closure goals for yearend 2006 were recommended for inefficient steelmaking capacities in Poland and the Czech Republic, which totaled 1.4 Mt/yr and 590,000 t/yr, respectively. However, Poland had shut down only 90,000 t/yr of capacity, and the Czech Republic apparently still had not shut down any crude steel production capacity by March 2006. These and other new EU member countries were able to defend maintaining high levels of crude steel production capacity because of increased demand and greatly improved steel market conditions for steel producers (relative to when the closures had been recommended by the EU). The EU15 (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom) maintained that productivity issues would provide sufficient grounds for requiring closure of less-efficient capacity if steel prices were to decline even slightly (Commission of the European Communities, 2006a, p. 6-7, 9, 14, 24-28, 37).

In 2006, in Western Europe, Germany continued to be the leading producer of crude steel, producing more than 47 Mt, followed by Italy, France, Spain, the United Kingdom, and Belgium. In Central Europe, each steel producing country had an annual output of about 10 Mt or less. Poland was the leading steel producer there, followed by the Czech Republic, Romania, and Slovakia. Some expansion in the iron and steel sector was taking place in Central Europe. In Bosnia and Herzegovina., Arcelor Mittal Steel had increased its iron ore output to 3.4 Mt in 2006 compared with 127,000 t in 2003 and its Mittal Steel Zenica steel mill was adding production capacity.

Russia and Ukraine together accounted for more than 90% of Central Eurasia's steel output; Russia's output of almost 71 Mt was considerably more than Ukraine's output of almost 41 Mt. In 2006, Russia was the fourth-ranked steel producer after China, Japan, and the United States.

All Russia's steelmaking plants increased output of crude steel in 2006, except one, and all but two increased output of rolled steel. In 2006, 44.6% of total steel production occurred at the three leading steel mills (Magnitogorsk, Novolipetsk, and Severostal). The rate of investment in the Russian steel sector varied greatly among enterprises. For the three leading steel mills, the average rate of investment was $32 per metric ton of steel produced; at the six second-tier group of steel mills, the average rate of investment was $15 per metric ton of steel; and for the third group of smaller steelmakers, the average rate of investment was only between $7 and $8 per metric ton.

Ukraine was Central Eurasia's second ranked steel producing country and ranked among the leading 10 steel producing countries in the world in 2006. Ukraine increased production of crude steel by about 5.9% compared with that of 2005 to 40.899 Mt. The country's production of finished rolled steel increased by less than 1% to 22.380 Mt. The country's major steel producing enterprises each produced more than 4 Mt/yr of steel, with some producing more than 7 Mt/yr. Strong demand for steel products globally had helped fuel Ukraine's economy, as Ukrainian steel producers were among the lowest-cost steel producers in the world. Ukraine's abundant iron ore and manganese ore reserves, its large coal production, its proximity to Russian coal supplies, and its developed transport infrastructure enabled the country to be a major global steel producer. The year started with a number of difficulties facing the steel industry caused by the weather, a shortage of natural gas, and a weak international market. After the first quarter of the year, however, conditions improved as supplies of iron ore and scrap increased as well as that of natural gas. The world market demand for and price of steel increased, which led to a revival of the country's steel production.

Iron Ore.—Russia and Ukraine were the major iron ore producers in the region. As of January 1, 2002, according to official Russian reserve calculations, Russia had 172 iron ore deposits with a reserve base that totaled 56.6 Gt with an average iron content of 35.87% and reserves that totaled about 25 Gt. Mining was taking place at 53 deposits. The iron ore reserves are composed of magnetite and hematite-magnetite ores with the average iron content in the magnetite ores ranging between 31% and 35% and in the hematite ores, between 40% and 50%. Open pit production accounted for more than 90% of ore production. In 2006, Russia's iron ore mining industry had stable economic conditions, which enabled the country to achieve a 7.3% growth in output to 102 Mt compared with almost 97 Mt in 2005. The

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growth was fueled by an increase in domestic demand for pig iron and also by the increased demand for iron ore on the world market. The major iron ore producers remained the enterprises in the Kursk Magnetic Anomaly (KMA) and in the North West region, which produced 56% and 17%, respectively, of total output. Growth was specifically notable at the Lebedinskiy and the Mikhaylovskiy mining and beneficiation complexes in the KMA and at the Korshunovskiy mining and beneficiation complex in the North West region..

Despite recent increases in iron ore production, Russia would need significant investment to increase iron ore output because mining conditions for iron ore were becoming more difficult owing to the increasing depths of the open pits. Expansion of iron ore mining was planned in the KMA; the expansion was expected to require large investment, however, because the ore lies under a thick layer of sedimentary rock that is inundated with water. Efforts were also underway to develop technology to mine deeper lying high-grade ore deposits in the KMA.

Ukraine reportedly has about 30 Gt of iron ore reserves. Reserves were reportedly adequate for between 15 and 20 years at the current rate of extraction. Two-thirds of the iron ore reserves are located in the Krivoy Rog basin, where practically all iron ore mining takes place. Although reserves were adequate to maintain production at the current rate past 2013, a large increase in production would require significant investment to develop underground mines to access additional reserves and to process large accumulations of iron-rich tailings. Also, Ukraine's reserve base was considered adequate to sustain production for another 50 to 80 years and was expected to play a key role in the development of Ukraine's ferrous metals sector.

Foreign investment in Ukraine's iron ore mining sector was resulting in increasing the country's iron ore output. In October 2005, the Krivoyrozh steel mill was sold to Arcelor Mittal Steel. Plans called for Arcelor Mittal to invest to increase the iron ore output at the mines it purchased along with the plant. The company planned to increase iron ore output at these mines from about 8 Mt of concentrate in 2005 to 13 Mt in 2009 and eventually to 16 Mt/yr.

In the northern and southern Balkans, iron ore output continued on a small scale as producers developed more electric-arc-furnace steel production and replaced domestic iron ore production with imports from the CIS. Some expansion of iron ore output was planned in Bosnia and Herzegovina. Sweden remained the only significant source of iron ore in Western Europe.

Central Eurasia was expected to continue to be the region's main producer of iron ore through 2013, with a modest increase in production projected for this area. In Central Europe, an increase in production was projected in Bosnia and Herzegovina. Overall, about a 15% increase in iron ore output was projected for the entire region by 2013 (table 10).

Lead and Zinc.—Central Eurasia, Central Europe, and Western Europe were relatively minor mine producers of lead. Europe and Central Eurasia continued to be an important producing region for primary and secondary refined lead. Although Western Europe was a significant producing region for primary refined lead, it produced an even larger share of the world's reported output of secondary refined lead. Data on recovery and use of secondary lead in Central Eurasia has remained incomplete, which makes it difficult to compare production levels for this commodity. In Central Eurasia, only Kazakhstan was a major producer of primary refined lead. Central Europe produced a small share of the world's output of primary and secondary lead.

Poland remained the leading mine producer of lead ore in the entire region followed by Sweden and Ireland. In the region, after Sweden and Ireland, the next ranking lead mining countries were Kazakhstan followed by Russia. Lead was one of the few metals where the leading mining countries in the region were in Western Europe rather than in Central Eurasia.

Mine production of lead could decrease through 2013, with most of the increase in mine output projected for Greece, Kazakhstan, and Russia, which would be offset mostly by production decreases in Poland and Sweden. The low quality of lead-zinc ores in Russia (in terms of metal content) compared with other parts of the world was expected to inhibit investment in their development, which would make it more difficult to substantially increase production. Reported plans for Europe and Central Eurasia until 2013 indicate an increase in the production of primary refined lead, with output buoyed by anticipated production increases in Central Eurasia, mainly in Kazakhstan and Russia. Zinc metal production in Central Eurasia was also projected to increase mainly in Kazakhstan and Russia.

Kazakhstan was the major lead and zinc producing country in the CIS and was also the leading producer of these metals in the Soviet era. The sector's major enterprise was the company Kazzinc, which controlled most lead and zinc production, except for significant zinc output associated primarily with copper, which was controlled by Kazakhmys. Another lead and zinc producer in Kazakhstan, ShalkiyaZinc N.V., was preparing to significantly increase production.

In 2006, Kazzinc produced 289,095 t of zinc, which exceeded its production target of 288,000. Plans called for spending $126 million of the planned investment on Kazzinc's New Metallurgy project, which included construction of a copper smelter and modernization of lead production facilities at its Ust-Kamenogorsk metallurgical plant.

In 2004, Kazzinc was awarded the tender for exploration and development of the Dolinnoe and the Obruchevskoe deposits near the town of Ridder in eastern Kazakhstan; mining was expected to commence in 2011. Plans called for mining 600,000 t/yr of ore from both deposits, which would yield a projected 25,600 t/yr of zinc and 51,000 troy ounces per year (about 1.6 t/yr) of gold.

ShalkiyaZinc had its main operations in southern Kazakhstan, which included the underground Shalkiya Mine in the Kyzylorda region; a processing plant near the town of Kentau, which is located 165 km southeast of the Shalkiya Mine; and a greenfield Talap deposit, which is located 30 km southwest of the Shalkiya Mine. One of the company's major assets was the Shalkiya deposit, which reportedly is the largest known zinc deposit in Kazakhstan and accounted for approximately 30% of the country's total zinc reserves. Based on a new audit of its reserves conducted by AMC Consultants of the United Kingdom according to the Australasian Joint Ore Reserves Committee (JORC) system, ShalkiyaZinc increased its plan to mine lead-zinc ore at its Shalkiya deposit to 4 Mt/yr from 3 Mt/yr by

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2010. According to the latest audit, ShalkiyaZinc's probable ore reserves at its Shalkiya deposit totaled 6.6 Mt of zinc and 1.7 Mt of lead and measured resources totaled 8.2 Mt of zinc and 2.1 Mt of lead. The new audit showed that the zinc content of ore that could be profitably mined was far lower than 3%, which was the previous assessment. ShalkiyaZinc had a contract with Outokumpu Technology Oy of Finland to construct a new ore processing plant at the deposit.

Following Kazakhstan, Russia was the next ranked producer of lead and zinc in the CIS. The UMMC, which was Russia's second ranked copper producer and which had facilities centered in the Urals, was also one of Russia's major lead and zinc producers. UMMC planned to increase zinc metal production to 250,000 t in 2012, which would be an increase of 184% compared with the 88,000 t of zinc the company produced in 2006. Plans called for UMMC to construct a 140,000- to 150,000-t/yr-capacity zinc smelter in the Sverdlovsk region, which would be capable of processing all UMMC's raw materials. The new smelter was to be commissioned in the summer of 2008. Plans called for UMMC to produce 87,500 t in 2007 and 2008 and to increase production to 110,000 t in 2009. In 2006, UMMC processed most of its zinc concentrate at its zinc refinery in Vladikavkaz, which had the capacity to produce 90,000 t/yr of zinc.

In 2006, UMMC produced 42,000 t of lead, with production of 28,000 t at its Elektrozinc enterprise in Vladikavkaz and 14,000 t at its Uralelektromed enterprise. UMMC planned to increase production at Elektrozinc by 79% to 50,000 t of lead by 2010, with output in 2007 targeted at 30,000 t.

Siberian Polymetals (a subsidiary of UMMC) planned to commission the Zarechenskiy Mine in June, which would increase polymetallic ore production by 100,000 t/yr in the first stage and would reach a design capacity of 300,000 t/yr of ore in 2009. In 2007, the new mine was projected to produce 30,000 t of ore. Reserves were reportedly 1.3 Mt of ore.

Nickel.—Russia was the world's leading producer of nickel. The majority of Russia's output was obtained from mixed sulfide ores at Noril'sk's operations in East Siberia and, to a lesser degree, from its operations on the Kola Peninsula. In 2006, Noril'sk, which was the world's leading nickel producer, produced 244,000 t of nickel metal products compared with 243,000 t in 2005; this level of production was in keeping with the company's production targets. Russia also produced nickel from laterite ores in the Ural Mountains. In Western Europe, relatively small quantities of nickel were mined in Finland and Greece from laterite deposits. In 2006, Russia produced about 21% of the world's refined nickel, and the countries of Western Europe produced about 8%.

In 2006, development was underway at Norilsk's Severny-Gluboky underground mine on the Kola Peninsula; when completed, the mine would have an annual capacity of 6 Mt of disseminated ore. Commissioned capacity at Severny-Gluboky was 1 Mt/yr in 2006. Longer-range plans for Noril'sk called for increasing the total annual ore production on the Kola and the Taymyr Peninsulas to 26 Mt by 2015 from 21.8 Mt in 2006. Production on the Taymyr Peninsula was projected to increase to 18.5 Mt in 2015 from 14.127 Mt in 2006, with the production of nickel-rich ore (grading 2.5% nickel, 2.25% copper, and 5 to 100 g/t PGM) and of cuprous ores (grading 0.2% to 2.5% nickel, 1% to 15% copper, and 5 to 50 g/t PGM) reaching levels of 7.5 Mt and 5.5 Mt, respectively; production of disseminated ores (grading 0.2% to 1.5% nickel, 0.3% to 2% copper, and 2 to 10 g/t PGM) was projected to reach 5.5 Mt.

The key projects that would enable Noril'sk to achieve its production target of 7.5 Mt/yr of nickel-rich ore on the Taymyr Peninsula were the development of the Skalisty Mine, which would have a total capacity of 3 Mt/yr, and the mining of lower horizons of the Taymyrsky Mine, which would increase total output at Taymyrsky to 4 Mt/yr by 2011. Production on the Kola Peninsula was projected to remain at about 7.5 Mt/yr, which would be achieved by commissioning the Severny-Gluboky Mine at its design capacity of 6 Mt/yr by 2012; production from Severny-Gluboky would offset the decommissioning of the Tsentralnaya open pit. Noril'sk's investment in its nickel operations in the period up to 2010 apparently would result in only modest increases in production, although a significant reduction in production that could have occurred because of decreasing ore grades would be averted.

Platinum-Group Metals.—Russia accounted for almost all mine output of platinum-group metals (PGM) in Europe and Central Eurasia. Small amounts of platinum and palladium also were mined by Finland, Poland, and Serbia. Russia and South Africa were the only two major producers of PGM in the world. Russia was the world's second ranked producer of PGM after South Africa in 2006. Russia's PGM output in contrast to that of South Africa was predominately palladium owing to a higher ratio of palladium to platinum in Russian ores than in South African ores.

Both metals have major applications in the industrial sector. Palladium and platinum and, to a lesser extent, rhodium are critical components of catalytic converters, which control automobile emissions, and platinum is the critical catalytic element in the Proton Exchange Membrane (PEM) fuel cell under development to power automobiles. PGM will be in much greater demand as the world's automobile fleet increases and is equipped with catalytic converters. As legislation calling for stricter automobile emissions controls is enacted, greater loadings of PGM in catalytic converters will likely be required. Also, the need for alternative sources of energy to oil could result in the development of a hydrogen-based economy powered by fuel cells that use platinum as a catalyst.

Noril'sk mined more than 95% of Russia's PGM output primarily from its deposits at its Polar Division in East Siberia, but the company also mined a small amount of PGM at its operations on the Kola Peninsula. PGM (mostly platinum) not from Noril'sk was mined from placer deposits in the Russian Far East, Siberia, and the Ural Mountains. In 2006, output at Noril'sk totaled 3,164,000 troy ounces (97.4 t) of palladium and 752,000 troy ounces (23.4 t) of platinum, which was a slight (0.9%) increase compared with that of 2005; the increase was the result of the increased content of PGM in the ore. Based on the results of an independent audit conducted in accordance with the standards of the JORC, proven and probable reserves of palladium on the Taymyr Peninsula exceeded 63 million troy ounces (about 1,960 t) and more than 16 million troy ounces of platinum (about 500 t) at a combined grade of 7.54 g/t PGM.

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Industrial Minerals

Diamond.—Russia was the region's only diamond producer. In 2006, Russia's diamond mine production increased by less than 1% to 38,360,810 carats. Russia mined 38 million carats of diamond in 2005. Mine production increased in value to $2.575 billion in 2006 from $2.531 billion in 2005. Russia exported about 35 million carats of uncut diamond valued at $1.746 billion in 2006, which included exports of diamond from the State Precious Metals and Gemstones Repository (Gokhran). Russia exported about 37 million carats of uncut diamond worth $1.687 billion in 2005.

ALROSA Company Ltd. accounted for 97% of Russian diamond production and about 25% of world rough gem diamond production. Its major mining operations were located in the Sakha (Yakutia) Republic, but in 2005, it commenced production at the Lomonosov diamond deposit in the northern European part of Russia in Arkhangelsk oblast.

ALROSA planned to expand its underground mining operations and its exploration activity in Sakha-Yakutiya. According to the company's president, the 2005 program, which is based upon ALROSA's 10-year development guidelines, called for the expansion of underground mine production as its first priority by gradually switching to underground mining at open pits to extract diamond ore reserves. To maintain stable operations, ALROSA also would need to increase ore reserves by carrying out intensive prospecting for new diamond deposits. The company planned to increase investment in exploration significantly.

Mineral Fuels and Related Materials

Most of the countries in Western and Central Europe were net importers of energy. With the exception of North Sea hydrocarbon production, Western Europe's sources of energy were expected to continue to be mainly based on imports from the Middle East and the CIS area. Major increases in energy consumption in the near term were not anticipated.

In Central Europe, domestic production of brown coal and lignite for electric power generation was likely to be maintained to reduce the need for imported natural gas and petroleum, which had been largely supplied by the CIS. Poland's hard coal industry was expected to continue to modernize and to play an important regional role in the energy field. Lignite, which was a fuel mainly used to power thermal electric power stations, continued to be an important source of energy in Central Europe and the Balkans.

Russia and other CIS oil and gas producers were expected to continue to be among the major providers of hydrocarbons to the world market. The rate of increases of future deliveries of these commodities to the world market, along with the successful exploration and development of new deposits, would depend in part on the resolution of pipeline and transport issues for their delivery.

Coal.—The CIS was the major coal producing region in Europe and Central Eurasia. Coal was produced in a large number of CIS countries, with Russia, Kazakhstan, and Ukraine, in that order, as the major coal producers. In 2006, Poland remained Central Europe's leading producer of anthracite, bituminous coal, and lignite. Poland's hard coal industry was expected to continue to modernize and to continue to play an important regional role in the energy sector.

Russia's coal production in the past several years had been increasing as the Russian economy had been growing and domestic demand for coal increasing. Revised projections for Russian coal production in a moderate case scenario called for production to increase to 410 Mt/yr by 2015 and 470 Mt/yr by 2020. Earlier projections had called for coal production in the moderate scenario to increase to 375 Mt/yr by 2020. As foreseen in the country's energy strategy program, coal production must increase by more than 100 Mt/yr by 2015 and by more than 160 Mt/yr by 2020 to meet the goals of the energy strategy program.

As of January 2006, Russia had in operation 97 underground coal mines and 139 open pits with a total capacity to mine about 325 Mt/yr of coal. The country's coal reserves were estimated to total about 200 Gt. Reserves were adequate to ensure coal output for centuries, even at double to triple the country's current output. The Kuznetsk Basin (Kuzbas) was the country's main producing region. The Kuzbas accounted for more than 56% of Russia's coal output and provided 80% of the metallurgical coal consumed domestically. Reserves in the Kuzbas contained all grades of hard coal, which were suitable for use in energy generation and coke production.

Although the creation of additional coal production capacity through upgrading and expansion of existing mines and development of new mines was potentially possible based on reserves, creating new capacity would require a level of investment in the coal sector, including investment in new technology far in excess of the historic level of investment in the past 5 years, which casts doubt on the feasibility of the planned expansion. An optimistic growth scenario would depend to a large extent on an increase in foreign investment, particularly from Chinese, Japanese, and South Korean companies.

In 2006, 14 coal mining enterprises in Russia were in the stage of design and construction and, when completed, would have a total combined capacity of 14 Mt/yr; 4 beneficiation plants were also in this stage and, when completed, would have a total combined capacity of 4 Mt/yr. Growth in coal production would come from the eastern part of the country from the large Kansk Achinsk brown coal basin; the Pechora Basin, which has significant reserves of metallurgical coal; and from the South Yakutiya basin. Coal production in the current large producing areas in the European part of Russia and the Ural Mountains was projected to stabilize; under favorable circumstances, however, production in this area could increase by 30 Mt/yr.

Ukraine has 34.1 Gt in proven coal reserves, which accounted for more than 60% of the FSU's total coal reserves. In 2006, Ukraine increased coal production by 1.7% to 75.284 Mt of raw coal. Metallurgical coal production decreased compared with that of 2005 to 30.145 Mt, but steam coal production increased by 10.9% to 50.112 Mt. Plans called for increasing coal production to 100 Mt in 2008, with 50 new coal faces scheduled to go into production by the end of 2007. Ukraine's energy strategy for the period to 2030, which was approved by the Government in 2006, called for increasing coal output to 130.3 Mt.

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In December 2007, Ukraine's Coal Industry Ministry had selected for development seven of the most promising hard coal deposits, which had combined reserves in excess of 1 Gt. Among the deposits were the Borzhikovskaya, the Dobropolskaya-Kapitalnaya, the Krasnolimanskaya-Glubokaya, and the Novosvetlovskaya in the Luhansk region, and the Chernohradskaya No. 3 and Tyaglovskaya No. 1 in the Lviv region. Mines at the seven new deposits would have a combined capacity to produce 17.7 Mt/yr of hard coal.

Ukraine's Coal Industry Ministry stated that Ukraine has explored brown coal reserves of 6 to 8 Gt with an average ash content of 20%. Most of the reserves are located in the Dnipr basin, as well as in the Cherkassy Kharkiv, Kirovohrad, Poltava, and Zhitomir regions. The Ministry planned to attract investors to develop deposits in the Dnipr brown coal basin, according to an investment project that it posted on its Web site on August 15, 2006. The project called for developing two deposits, the Aleksandriiskoye and the Verkhnedniprovskoye deposits, which had reported reserves of 236 Mt, for which the explored sections were considered suitable for open pit development. The Ministry calculated that these deposits had the potential to produce 5 to 6 Mt/yr by open pit mining. Mines at the deposits were projected to come onstream in 2 years.

According to Kazakhstan's classification system for mineral reserves, total geologic coal resources were assessed to be between 150 Gt and 160 Gt, of which 62% is brown coal and the remainder, bituminous coal. In 2006, Kazakhstan produced 96.3 Mt of coal, which was an 11.5% increase compared with production in 2005.

Kazakhstan had plans to increase production of coal, almost all of which would be subbituminous. Plans for 2007 called for implementing development projects in the Ekibastuz subbituminous coal basin and closing unprofitable coal mines in the Karaganda basin. Long-range plans called for Kazakhstan to increase its annual coal production to 145.6 Mt by 2020, according to the Coal Industry Department of the Energy and Mineral Resources Ministry. Production of metallurgical coal was projected to increase to 24.3 Mt in 2020 from 12.9 Mt in 2006, and production of steam coal, to 121.3 Mt from 83.4 Mt. Achieving the targeted level for 2020 would require an investment of $3.9 billion, of which $2.1 billion would be targeted for metallurgical coal development, and $1.8 billion, for steam coal.

Kazakhstan also planned to reduce coal consumption by 45% by 2024 as part of its program to achieve sustainable growth. At the same time, the use of renewable energy was targeted to increase to 5% in 2024 from 0.2% in 2006.

Natural Gas.—Central Eurasia (mainly Russia) produced a substantial share of the world's production of natural gas, which in 2006 amounted to about 28.5% of the world total. Europe, excluding the CIS, accounted for about 11% of world output. Russia was the world's leading natural gas producer and exporter and it has the world's largest natural gas reserves, with 1,680 trillion cubic feet (almost 47.6 trillion cubic meters) of reserves, which is almost twice the size of the reserves in the next ranked country, Iran.

In 2006, natural gas production in Russia increased by about 3% compared with that of 2005 to more than 656 billion cubic meters. In 2006, OAO Gazprom sold 161.5 billion cubic meters of gas to European countries, and it sold an additional 101 billion cubic meters to the Baltic States and the CIS. Almost 90% of the country's natural gas was produced in the Ndym-Pur-Taz (NPT) region in northern West Siberia. Gasfields in this region, however, were in decline, as reserves were being depleted. Owing to the growth in the Russian economy, which was causing an increase in domestic demand, and the country's long-term export commitments to Europe, Russia would need to increase gas output to meet demand, which would entail incurring greater costs to develop fields further north and to the east in an even more difficult physical environment than in the NPT region. A main target for future development could be the Yamal Peninsula, where large reserves were discovered in several fields.

Gazprom, a joint stock company in which the Russian Government was the largest stakeholder, produced 83.9% of the country's gas output in 2006 and controlled and operated the country's natural gas trunk pipeline network. Although Gazprom projected that between 2008 and 2030 it would increase natural gas output, most increases in natural gas output were projected to come from independent gas companies such as Itera, Northgaz, and Novatek, which, although blocked from the export market, had found a niche supplying the domestic market. Priorities for Gazprom were the development of gasfields on the Yamal Peninsula and the Arctic continental shelf and in East Siberia and the Far East.

Kazakhstan and Turkmenistan, which were large regional producers of natural gas, also could be major factors in the region's expected increase in output. In 2007, the Oil and Gas Journal revised upwards its estimate of proven natural gas reserves in Kazakhstan to 100 trillion cubic feet (about 2.8 trillion cubic meters), which was roughly equal to Turkmenistan's natural gas reserves.

Although Kazakhstan produced about as much natural gas in 2006 as it consumed, the country was poised to become a net exporter in 2008 based on production at the Karachaganak and the Tengiz fields. Natural gas production in Kazakhstan was almost entirely associated gas. More than 70% of the country's natural gas was produced by international consortia at the Karachaganak and the Tengiz fields. Most of Kazakhstan's natural gas reserves are located in the west of the country, with about 25% of its proven reserves located in the Karachaganak field. This oil and gas condensate field reportedly has proven natural gas reserves of 48 trillion cubic feet (1.36 trillion cubic meters). The consortium developing Karachaganak expected to produce 900 billion cubic feet (about 25.5 billion cubic meters) by 2012.

Another important natural gas field, Amangeldy, is situated in the south of the country near Zhambul. Exploratory drilling in 2001 indicated reserves of up to 1.8 trillion cubic feet (about 51 billion cubic meters). The field was being developed primarily by Kazmunaigas, and the company expected initial production of roughly 35 billion cubic feet per year (about 991 million cubic meters per year).

According to the 15-year strategy of the Kazakhstan Ministry for Energy and Mineral Resources, the country plans to increase its natural gas production to 1.66 trillion cubic feet (about

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47 billion cubic meters) by 2010, and to 1.84 trillion cubic feet (about 52 billion cubic meters) by 2015.

Turkmenistan was one of the leading countries in the world in the quantity of its natural gas reserves. All gas pipelines that connect Turkmenistan to world markets had been owned by the Russian company Gazprom and routed through Russia. In the 1990s, Turkmenistan was denied access through this pipeline network to world markets, and thus Turkmenistan's incentive to produce natural gas was greatly reduced. Turkmenistan was negotiating gas supply agreements with Russia and Ukraine that would increase Turkmenistan's gas exports to these countries. An agreement signed with Russia in September 2006 indicated that Turkmenistan would increase exports of natural gas from about 6 billion cubic meters in 2005 to about 50 billion cubic meters in 2007 and then to about 80 billion cubic meters in 2009 where it would remain until 2028. A portion of this gas sent to Russia would go to Ukraine.

The limited capacity of the existing natural gas pipelines and lack of alternative natural gas export routes constrained Turkmenistan's natural gas export potential and made exports vulnerable to disruptions. A Trans-Afghan pipeline (TAP) was under consideration to export Central Asian natural gas through Afghanistan to Pakistan. The majority of this gas would come from Turkmenistan's Dauletabad field, which, according to authorities in Turkmenistan, holds more than 60 trillion cubic feet (almost 1.7 trillion cubic meters). If verified, it would make this field the fourth largest in the world.

In spring of 2006, Turkmenistan's President signed an agreement with China to build an export pipeline to the east to export Turkmenistan's gas. According to the agreement, in the first phase of the project (starting in 2008), Turkmenistan was to deliver about 30 billion cubic meters per year of gas through Uzbekistan and Kazakhstan to Urumci in western China and beyond to Shanghai, and then to increase these volumes to up to 50 billion cubic meters per year by 2010. Experts have cast doubt on the project's feasibility for a number of reasons, including a lack of details about the financing and construction. Turkmenistan's various export commitments far exceed its current production and it is not clear that additional production could be commissioned in time to meet these commitments.

In 2006, Azerbaijan produced almost 6.1 billion cubic meters of natural gas, which was a 6% increase compared with that of 2005. About 60% of natural gas production was produced by Azneft, which was a subsidiary of State Oil Company of Azerbaijan (SOCAR). The remainder was produced by joint ventures, of which the leading joint venture in terms of production was the Azerbaijan International Operating Company (AIOC). In 2008, increases in production from SOCAR and the Shah Deniz gas and condensate field could increase the country's production to more than 500 billion cubic feet (almost 14.2 billion cubic meters) per year. Government sources in Azerbaijan predicted that the country would produce as much as 1.1 trillion cubic feet (more than 31 billion cubic meters) per year by 2011.

Almost all the natural gas produced in Azerbaijan came from offshore fields. The country's leading natural gas field was the Bakhar oilfield and gasfield, which is located off the southern tip of the Absheron Peninsula and which accounted for almost one-half of the country's natural gas output.

Azerbaijan's major natural gas production increases were expected to come from the development of the Shah Deniz offshore natural gas and condensate field, which was estimated by industry analysts to be one of the world's largest natural gas field discoveries of the past 20 years. Shah Deniz, which is located offshore approximately 60 miles southeast of Baku, was being developed by the Shah Deniz consortium, whose members were BP p.l.c., which was headquartered in the United Kingdom; LukAgip (a joint venture of OAO LUKOIL Co. of Russia and Agip, which was a subsidiary of Eni S.p.A of Italy); National Iranian Oil company (NICO); SOCAR; Statoil ASA of Norway; Total S.A. of France; and Turkiye Petrolleri Anonim Ortaklig (TPAO) of Turkey. According to BP, which was the project operator, Shah Deniz has potential recoverable reserves of about 15 trillion cubic feet (or almost 425 billion cubic meters) of natural gas and 600 million barrels (or almost 82 Mt) of condensate. Using different and varying criteria for defining reserves, other industry and trade sources have estimated the field's size to be as much as 35 trillion cubic feet (about 990 billion cubic meters).

With the development of Shah Deniz, Azerbaijan could eventually become a net natural gas exporter, although Azerbaijan would remain a net importer during 2007. Azerbaijan's natural gas exports would be transported mainly through the South Caucasus Pipeline, which is also known as the Baku-T'bilisi-Erzurum Pipeline. It will run parallel to the Baku-Tblisi-Ceyhan (BTC) pipeline for most of its route before connecting to the Turkish gas pipeline network near the town of Horasan. The pipeline was expected to transport 233 billion cubic feet (about 6.6 billion cubic meters) per year initially, and this amount could be increased eventually to 700 billion cubic feet (almost 20 billion cubic meters) per year.

Petroleum.—Central Eurasia was the leading oil producing region in Europe and Central Eurasia and one of the leading oil producing regions in the world. Oil production in Central Eurasia was centered mainly in Russia in West Siberia. Development of major new petroleum resources, however, was taking place offshore in the Caspian Sea by the littoral states in conjunction with Western firms. The countries of the Caspian Sea region were important to world energy markets because of the large oil and gas reserves in this region that were being developed. Proven oil reserves for the entire Caspian Sea region (estimated to be between 18 billion and 35 billion barrels, or about 2.5 and 4.8 Gt, respectively) were comparable to those of the United States (22 billion barrels, or about 3 Gt) and greater than those in the North Sea (17 billion barrels, or 2.3 Gt); estimated undiscovered oil resources could provide another 235 billion barrels (about 32 Gt) of oil.

For the past decade, Azerbaijan's offshore oil deposits in the Caspian Sea had been a major focus for global oil development. Azerbaijan was the leading contributor to non-Organization of the Petroleum Exporting Countries (OPEC) growth in the global oil supply during 2006. Growth in oil production had come almost exclusively from growth at the Azeri-Chirag-Guneshli (ACG) group of fields. The ACG group of fields produced more than 65% of the country's oil, and this share was expected to increase. According to industry journals, estimates of Azerbaijan's proven crude oil reserves range between

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7 billion and 13 billion barrels, but SOCAR estimated proven oil reserves to be 17.5 billion barrels based on the Soviet reserve classification system (which is not based on economic criteria similar to that used to evaluate reserves in market economy countries).

Azerbaijan had signed more than 20 major agreements to develop oilfields with about 30 companies from 15 countries. Azerbaijan exported almost all its oil through the newly built BTC pipeline, which bypasses Russia. Azerbaijan began filling the BTC pipeline in 2005. The achievement of capacity flow through BTC was expected to enable oil production from the offshore ACG project to increase. Increasing oil production and the concomitant increased oil revenues were expected to contribute significantly to the growth of Azerbaijan's GDP.

Kazakhstan was poised to become an even more significant supplier to world oil markets in the next decade. In 2006, Kazakhstan produced 64.8 Mt of oil and gas condensate, which was 5.5% more than in 2005, and exported 57.1 Mt. Kazakhstan has most of the largest known oilfields in the Caspian Sea. The country's combined onshore and offshore proven hydrocarbon reserves were estimated to be between 9 billion and 40 billion barrels (1.2 and 5.4 Gt), which is comparable to Algeria on the lower end and Libya on the higher end of the estimates. Kazakhstan's major oil producing fields included the CNPC-Aktobemunaigas, the Karachaganak, the Kumkol, the Mangistaumunaigas, the Tengiz, and the Uzenmunaigas, which accounted for about 70% of hydrocarbon production in the country. Other production was centered in smaller fields.

Oil production growth was expected to increase in the next decade primarily from the Tengiz field, where production was expected to double, and from the Kashagan offshore field, which could produce an additional 1 million barrels per day (Mbbl/d) after 2011. The Tengiz field, which had been under development since 1993 by the Tengizchevroil joint venture, was the country's leading oil producer; its recoverable crude oil reserves were estimated by Chevron Corp. to be between 6 billion and 9 billion barrels (800 Mt and 1.2 Gt). According to Chevron, Tengiz could potentially produce 700,000 barrels per day (bbl/d) by 2010 if its sour gas injection program is fully implemented.

The Kashagan field, which is located off the northern shore of the Caspian Sea near the city of Atyrau, is the largest oilfield outside of the Middle East and the fifth largest in the world (in terms of reserves). The field's recoverable reserves were estimated to be 13 billion barrels (1.77 Gt) of oil equivalent, with total reserves-in-place of about 38 billion barrels (5.2 Gt) The field could produce about 300,000 bbl/d by late 2011 with full-scale commercial production expected to begin in 2013. Estimated peak production from Kashagan was estimated to be about 1.3 Mbbl/d.

In 2006, Russia's production of crude oil increased by 2.3% to about 480 Mt and made Russia the world's leading oil producer, overtaking Saudi Arabia. Russia remained the world's second ranked oil-exporting nation. Since 2004, however, the rate of growth in Russian oil production had leveled off to somewhat above 2% annually, which has called into question the long-term growth prospect for Russia's oil. Slow growth had been attributed to lack of adequate investment, although questions had also been raised regarding the country's reserve potential. According to data in the BP Statistical Review of Energy 2006, Russia's proven reserves of oil and gas condensate at the end of 2005 totaled 10.2 Gt, which yielded a reserves-to-production ratio of 21.4 years. However, reserves in fields that were in operation would be depleted within a decade. In 2006, additions to reserves exceeded production. Some Russian officials believed that Russia has a large resource base that could serve to replenish oil reserves if adequate investment is devoted to exploration.

Most of Russia's oil reserves are located in West Siberia between the Ural Mountains and the Central Siberian Plateau. Little exploration had occurred in East Siberia despite the promise of large resources. For the coming decade, Russian oil production was projected to grow at an annual rate of about 1.5% to 2.5% annually owing in part to increased output from oil development on Sakhalin Island, which would be coupled with a slowdown in growth from the major mature oilfields in West Siberia, a number of which had passed peak production. New fields were under development, which could produce almost all Russia's increase in annual oil output in the next 5 years and would probably produce more than one-half of the country's oil in 2020. The new fields being developed during the next 5 years that could help stem production losses at older fields included development projects on Sakhalin Island, the West Salymskoye project (a Royal Dutch Shell plc joint venture), the TimanPechora project (a joint venture of Lukoil of Russia and ConocoPhillips Co. of the United States), the Prirazlomnoye offshore project (a joint venture of Russian companies Rosneft and Gazprom), and the Vankorskoye and Komsomolskoye development project (Rosneft).

Uranium.—Central Eurasia was one of the world's leading uranium mining regions and accounted for 30.6% of world production. The three major uranium mining countries were Kazakhstan, which produced about 14% of world production; Russia, which produced about 8%; and Uzbekistan, which produced about 6%. Ukraine produced a smaller amount of uranium. In the rest of Europe, Bulgaria and the Czech Republic mined uranium and Germany produced a small amount of uranium from reprocessing waste materials from a closed uranium mining operation on the territory of the former German Democratic Republic.

Kazakhstan, which in 2006 produced 5,279 t of uranium (21% more than was produced in 2005), was planning by 2012 to become the world's leading uranium producing country. All uranium mining, processing, and trade were under the control of of the state corporation Kazatomprom. Plans announced in May called for Kazatomprom to produce 17,500 t/yr of uranium by 2013, which would involve putting 12 new mines into operation by 2009. This plan revised upwards Kazatomprom's production goal for 2010 because of a reassessment of world demand. The company projected achieving a maximum output of 20,000 t/yr by 2016, which it could maintain until 2027.

Russian uranium production was controlled by the Corporation TVEL. TVEL fully supplied fuel to 73 nuclear powerplants in Russia and 13 other countries, to 30 research reactors in Russia and abroad, and to ship-propulsion reactors of the Russian fleet. TVEL held 17% of the world's nuclear fuel market. TVEL included enterprises that mined and processed uranium.

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In 2006, under an initiative launched by Russia's President, a course was set for increasing nuclear power generation's share to 25% of the country' energy generation by 2030, which would involve building up to 40 new nuclear reactors in Russia. During 2006, TVEL devoted its efforts to the development of mining enterprises.

TVEL's Priargunsky Industrial Mining and Chemicals Association in the Chita region could increase uranium production by more than 50% by 2014 to 2015 to 5,000 t/yr. Plans called for Priargunsky to develop the Sixth and Eighth Mines. The Sixth Mine would be the main source of uranium and was scheduled to be producing 1,000 t/yr and the Eighth Mine 800 t/yr. With production from these two mines, Priargunsky could produce 5,000 t/yr. Considerable investment would be required to commission these new mines and also to implement associated measures to protect the environment.

Russia was establishing the Uranium Mining Company (UMC), which was registered on November 20, 2006, to consolidate its uranium mining assets in Russia and abroad. UMC would mine uranium not just in Russia but also abroad, possibly in Australia and Canada. Plans called for UMC to be fully formed during the first half of 2008. This would require transferring the mining assets of TVEL to UMC, which would first become the trustee of these assets. The company would be fully established once Atomenergoprom, a holding company of civilian atomic energy enterprises, was formed. Russia's Prime Minister signed a resolution establishing Atomenergoprom, but the Government would have to issue another resolution approving the new holding's charter before it could be fully established. Atomenergoprom was scheduled to be formed by July 1, 2007.

References Cited

Commission of the European Communities, 2006a, Analysis of economic indicators of the EU metals industry—The impact of raw materials and energy supply on competitiveness: Brussels, Belgium, Commission of the European Communities staff working document, no. 1069, August 2, 126 p.

Commission of the European Communities, 2006b, Enlargement strategy and main challenges 2006–2007, including annexed special report on the EU's capacity to\integrate new members: Brussels, Belgium, Commission of the European Communities, Communication from the Commission to the European Parliament and the Council no. 649, August 11, 58 p.

Commission of the European Communities, 2006c, On strengthening the European neighbourhood policy: Brussels, Belgium, Commission of the European Communities, Communication from the Commission to the European Parliament and the Council, no. 726, December 4, 14 p.

Cox, David, and Goulden, Jason, 2005, Worldwide exploration trends 2005: China Mining 2005, November. (Accessed January 26, 2006, at http://www.china-mining.com/papers.shtml.)

Edelstein, D.L., 2007, Copper: U.S. Geological Survey Mineral Commodity Summaries 2007, p. 52-53.

Helmer, John, 2007, Putin takes first step towards liberalizing exports of PGMs and diamonds: Mineweb, January 15. (Accessed February 21, 2007, via www.mineweb.net/.)

Leskov, Mikhail, 2004, Project evaluation—A Russian viewpoint: Mining Journal, September 24 supplement, p. 21.

Metals Economics Group, 2006, Trends in worldwide exploration budgets—Worldwide exploration budgets reach new high-water mark: Strategic Report, v. 19, no. 6, November/December, p. 1-9.

Mining Magazine, 2006, Russian thaw: Mining Magazine, February 2006, p. 40.

Ney, Roman and Smakowski, Tadeusz, eds., 2004, Bilans Gospodarki Surowcami W Polce Na Tle Gospodarke Swiatowoj 1998-2003 (Minerals Yearbook of Poland): Krakow, Poland, Polish Academy of Sciences, Ministry of Environmental Protection, Natural Resources and Forestry, December, 515 p.

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TABLE 1

EUROPE AND CENTRAL EURASIA: AREA AND POPULATION (2006)[1]

Region and country	Area (square kilometers)	Population (thousands)
Western Europe:		
Austria	83,870	8,193
Belgium	30,528	10,379
Cyprus	9,250	784
Denmark	43,094	5,451
Finland	338,145	5,231
France	547,030	60,876
Germany	357,021	82,422
Greece	131,940	10,688
Iceland	103,000	299
Ireland	70,280	4,062
Italy	301,230	58,134
Luxembourg	2,586	474
Malta	316	400
Netherlands	41,526	16,491
Norway	323,802	4,611
Portugal	92,391	10,606
Spain	504,782	40,398
Sweden	449,964	9,017
Switzerland	41,290	7,524
United Kingdom	244,820	60,609
Total	3,716,865	396,649
Central Europe:		
Albania	28,748	3,582
Bosnia and Herzegovina	51,129	4,499
Bulgaria	110,910	7,385
Croatia	56,542	4,495
Czech Republic	78,866	10,235
Estonia	45,226	1,324
Hungary	93,030	9,981
Latvia	64,589	2,275
Lithuania	65,200	3,586
Macedonia	25,333	2,051
Montenegro	14,026	631
Poland	312,685	38,537
Romania	237,500	22,304
Serbia	88,361	9,396
Slovakia	48,845	5,439
Slovenia	20,273	2,010
Total	1,341,263	127,730
Central Eurasia:		
Armenia	29,800	2,976
Azerbaijan	86,600	7,962
Belarus	207,600	10,293
Georgia	69,700	4,661
Kazakhstan	2,717,300	15,233
Kyrgyzstan	198,500	5,214
Moldova	33,843	4,467
Russia	17,075,200	142,894
Tajikistan	143,100	7,321
Turkmenistan	488,100	5,043
Ukraine	603,700	46,711
Uzbekistan	447,400	27,307
Total	22,100,843	280,082
Regional total	27,158,971	804,461

[1]Source: U.S. Central Intelligence Agency, The World Factbook 2006

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TABLE 2
EUROPE AND CENTRAL EURASIA: GROSS DOMESTIC PRODUCT[1]

Region and country	Purchasing power parity: Gross value (million dollars)	Purchasing power parity: Per capita (dollars)	Annual percentage change (constant prices)
Western Europe:			
Austria	299,245	36,215	3.3
Belgium	356,654	33,694	2.9
Cyprus	19,955	25,828	4.0
Denmark	194,830	35,896	3.9
Finland	173,046	32,859	4.9
France	1,956,775	31,893	2.0
Germany	2,668,947	32,432	2.9
Greece	304,007	27,333	4.2
Iceland	11,390	37,019	4.4
Ireland	172,228	40,669	5.7
Italy	1,714,954	29,348	1.8
Luxembourg	35,639	75,395	6.1
Malta	8,818	21,698	3.4
Netherlands	602,050	36,833	3.0
Norway	232,792	50,203	2.5
Portugal	220,379	20,818	1.3
Spain	1,267,934	28,772	3.9
Sweden	317,737	34,865	4.1
Switzerland	283,593	38,919	3.2
United Kingdom	2,018,812	33,351	2.9
Total	12,859,785	XX	XX
Central Europe:			
Albania	18,300	5,808	5.0
Bosnia and Herzegovina	25,520	6,460	6.2
Bulgaria	79,187	10,294	6.3
Croatia	63,532	14,309	4.8
Czech Republic	227,721	22,184	6.4
Estonia	25,749	19,149	11.2
Hungary	183,907	18,251	3.9
Latvia	35,102	15,298	11.9
Lithuania	53,406	15,735	7.7
Macedonia	16,093	7,879	3.7
Montenegro	5,362	8,909	6.5
Poland	567,696	14,884	6.2
Romania	225,613	10,426	7.9
Serbia	70,145	9,427	5.7
Slovakia	96,708	17,871	8.5
Slovenia	50,201	24,971	5.7
Total	1,744,242	XX	XX
Central Eurasia:			
Armenia	14,679	4,326	13.3
Azerbaijan	51,681	6,092	30.6
Belarus	94,738	9,766	10.0
Georgia	17,763	4,036	9.4
Kazakhstan	150,469	9,962	10.7
Kyrgyzstan	9,451	1,819	3.1
Moldova	9,110	2,691	4.0
Russia	1,881,107	13,173	7.4
Tajikistan	10,678	1,673	7.0
Turkmenistan	23,326	4,570	11.1
Ukraine	290,573	6,253	7.1
Uzbekistan	57,058	2,115	7.3
Total	2,610,633	XX	XX
Regional total	17,214,660	XX	XX

XX Not applicable.
[1]Source: International Monetary Fund, World Economic Outlook Database 2006.

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TABLE 3
SELECTED EXPLORATION ACTIVITY IN EUROPE AND CENTRAL EURASIA IN 2006

Country	Site	Commodity[1]	Company	Phase[2]	Type[3]
Albania	Korçë	Ni	European Nickel plc.	Exploration	New.
Armenia	Hankavan/Toukhmanuk	Au	Global Gold Corp.	Exploration	New.
Do.	Tukhmanuk	Au	do.	Production	Extension.
Bulgaria	Ogosta	Au	Balkans Gold plc.	Exploration	New.
Do.	Tashlaka Hill	Au	Asia Gold Corp.	Exploration	Continuing.
Do.	Trun/Nadejda	Au	Euromax Resources Ltd.	Exploration	New.
Finland	Arctic	PGM	North American Palladium Ltd.	Exploration	Continuing.
Do.	Haarakumpu	Au, Cu, Co	Belvedere Resources Ltd.	Exploration	Continuing.
Do.	Hannukainen	Au, Cu	Northland Resources Inc.	Exploration	Continuing.
Do.	Haveri/Ansomaki	Au	Northern Lion Gold Corp.	Feasibility	Extension.
Do.	Keivitsa	Ni, Cu, Au, Pd, Pt	Scandinavian Gold Ltd.	Exploration	Continuing.
Do.	Kettukuusikko	Au	Taranis Resources Inc.	Exploration	New.
Do.	Kiimala/Kopsa	Au	Belvedere Resources Ltd.	Exploration	New.
Do.	Kittila (formerly Suurikuusikko)	Au	Agnico-Eagle Mines Ltd.	Developing	Extension.
Do.	Koillismaa-Naranka	Ni, Cu, PGM	Nortec Ventures Corp.	Exploration	Continuing.
Do.	Kylylahti	Cu, Co	Vulcan Resources Ltd.	Exploration	Continuing.
Do.	Oijarvi	Au, Ag	Agnico-Eagle Mines Ltd.	Exploration	Continuing.
Do.	Orivesi	Au	Dragon Mining NL	Producer	Extension.
Do.	Osikonmäki	Au	Belvedere Resources Ltd.	Exploration	New.
Do.	Peuna-aho	Ni, Cu, PGM	Vulcan Resources Ltd.	Exploration	Continuing.
Do.	Talvivaara	Cu, Zn, Co	Metso Minerals Ltd.	Feasibility	Extension.
Georgia	Lukhra	Au	Eastern Mediterranean Resources Public Ltd.	Exploration	New.
Greece	Skouries	Au, Cu	European Goldfields Ltd.	Feasibility	Extension.
Do.	Stratoni	Pb, Zn, Ag	do.	Producer	Extension.
Greenland	Aappaluttoq	Ruby	True North Gems	Exploration	Continuing.
Do.	Black Angel	Zn, Pb, Ag	Angus and Ross plc.	Exploration	Continuing.
Do.	Garnet Lake	Diamond	Hudson Resources Inc.	Exploration	Continuing.
Do.	Isotoq	Ti, V	MDA Investment Pty. Ltd.	Exploration	Continuing.
Do.	Malmbjerg	Mo	International Molybdenum plc.	Exploration	Continuing.
Do.	Seqi	Olivine	Minelco AB	Producer	Extension.
Ireland	Bohaun	Au, Ag	Alba Mineral Resources plc.	Exploration	Continuing.
Do.	Curraghinalt	Au	Tournigan Gold Corp.	Exploration	Continuing.
Do.	Galmoy area	Zn, Pb, Ag	Lundin Mining Corp.	Exploration	Continuing.
Do.	Keel	Zn	do.	Exploration	Continuing.
Do.	Lisheen	Zn	Anglo American plc.	Producer	Extension.
Do.	Omagh	Au	Galantas Gold Corp.	Exploration	Continuing.
Do.	Tara	Zn	Boliden Corp.	Producer	Extension.
Italy	Poggio Pietricci	Au	Adroit Resources Inc.	Exploration	New.
Do.	Unnamed	Au	do.	Exploration	New.
Do.	Varallo	Ni, Cu, Co, PGM	Solid Resources Ltd.	Exploration	New.
Kazakhstan	Akbastau	Cu, Ag	Kazakhmys plc.	Exploration	Continuing.
Do.	Aktogay	Cu, Ag	do.	Feasibility	Extension.
Do.	Artemyevskoe	Cu, Ag	do.	Producer	Extension.
Do.	Boschekul	Cu, Ag	do.	Feasibility	Extension.
Do.	Kempirsai	Ni, Co	Bekem Metals Inc.	Feasibility	Extension.
Do.	Kerbay	Au	Alhambra Resources Ltd.	Exploration	New.
Do.	Kosmurun	Cu, Ag	Kazakhmys plc.	Exploration	Continuing.
Do.	Naimanjal/Baitimir/Beschoku	Ag, Au	Frontier Mining Ltd.	Exploration	Continuing.
Do.	Sazhen	Au	Gold Aura Kazakhstan Ltd.	Exploration	New.
Do.	Sekisovskoye	Au	Hambledon Mining plc.	Producer	Extension.
Do.	Shaimerden	Zn	ZincOx Resources plc.	Producer	Extension.
Do.	Shirotnaia	Au	Alhambra Resources ltd.	Exploration	Continuing.
Do.	Tserkovka	Au	Hambleton Mining plc.	Exploration	New.
Do.	Uzboy	Au	Alhambra Resources Ltd.	Production	Extension.

See footnotes at end of table.

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TABLE 3—Continued
SELECTED EXPLORATION ACTIVITY IN EUROPE AND CENTRAL EURASIA IN 2006

Country	Site	Commodity[1]	Company	Phase[2]	Type[3]
Kazakhstan—Continued	Varvarinskoye	Au, Cu	European Minerals Corp.	Developing	Extension.
Do.	Voskhod	Cr	Oriel Resources plc.	Developing	Extension.
Do.	Vostok	Cu	Scarborough Minerals plc.	Exploration	Continuing.
Do.	Zhaman-Aybat	Cu, Ag	Kazakhmys plc.	Developing	Extension.
Kosovo (Yugoslavia)	Unnamed	Cu	Phelps Dodge Corp.	Exploration	New.
Kyrgyzstan	Aksur	Au	Palladex plc.	Exploration	New.
Do.	Andash	Au, Cu	Aurum Mining plc.	Exploration	Continuing.
Do.	Gavasai	Au	Monaro Mining NL	Exploration	New.
Do.	Kumtor	Au	Centerra Gold Inc.	Producer	Extension.
Do.	Obdilla	Au	Perseus Mining Ltd.	Exploration	New.
Do.	Orgatash	Au	Eurasian Minerals Inc.	Exploration	New.
Do.	Severny	Au	Centrasia Mining Corp.	Exploration	Continuing.
Do.	Taldybulak	Au, Cu	Lero Gold Corp.	Exploration	Continuing.
Do.	Tokhtonnisai	Au, Cu	do.	Exploration	New.
Do.	Uzunbulak	Au	Kentor Gold Ltd.	Exploration	New.
Norway	Gubbträsk	Au	Lappland Goldminers AB	Exploration	Continuing.
Do.	Hurdal	Au	Crew Gold Corp.	Exploration	New.
Do.	South Norway/Ertelien	Ni, Cu	Blackstone Ventures Inc.	Exploration	Continuing.
Do.	Tjälmträsk	Au	Lappland Goldminers AB	Exploration	Continuing.
Portugal	Aljustrel/Moinho	Zn	EuroZinc Mining Corp.	Feasibility	Extension.
Do.	Cercal	Au, Cu	Northern Lion Gold Corp.	Exploration	New.
Do.	Montemor	Au	Iberian Resources Ltd.	Feasibility	Extension.
Do.	Neves-Corvo	Cu, Pb, Zn	EuroZinc Mining Corp.	Producer	Extension.
Do.	Panasqueira	W	Primary Metals Corp.	Producer	Extension.
Do.	Portalegre	Au	Iberian Resources Ltd.	Exploration	Continuing.
Romania	Certej	Au, Ag	European Goldfields Ltd.	Feasibility	Extension.
Do.	Colnic	Au, Cu	Carpathian Gold Inc.	Exploration	Continuing.
Do.	Muntele Rotund	Au, Ag	Cloudbreak Resources Ltd.	Exploration	Continuing.
Do.	Rovina	Au, Cu	Carpathian Gold Inc.	Exploration	Continuing.
Russia	Adamikha	Au, Ag	Peter Hambro Mining plc.	Exploration	New.
Do.	Albin	Au	do.	Exploration	New.
Do.	Asacha	Au	Trans Siberian Gold Corp.	Feasibility	Extension.
Do.	Blagodatnoye	Au	Polyus Gold	Developing	Extension.
Do.	Bryantinskiy	Au, Ag	Peter Hambro Mining plc.	Exploration	New.
Do.	Chelyabinsk/Miheevskoye	Cu, Au, Mo	Eureka Mining plc.	Feasibility	Extension.
Do.	East Pansky	PGM	Consol. Puma Minerals Corp.	Exploration	Continuing.
Do.	Federova	Pt, Pd	Barrick Gold Corp.	Exploration	Continuing.
Do.	Gaiskoe, Osenkoe, Letnee	Cu	Metso Minerals	Developing	Extension.
Do.	Gar II	Au, Ag	Peter Hambro Mining plc.	Exploration	New.
Do.	Gedabek	Au, Cu, Ag	Anglo Asian Mining plc.	Exploration	Continuing.
Do.	Ixinsky	Bauxite	Rusal	Exploration	New.
Do.	Izvestkovaya Sopka	Au, Ag	Peter Hambro Mining plc.	Exploration	New.
Do.	Julietta/Evgenia	Au, Ag	Bema Gold Corp.	Producer	Extension.
Do.	Kun Manie	Ni	Amur Minerals Corp.	Exploration	New.
Do.	Kupol	Au, Ag	Bema Gold Corp.	Developing	Extension.
Do.	Malomir	Au	Peter Hambro Mining plc.	Exploration	Continuing.
Do.	Miheevskoye	Cu, Au	Eureka Mining plc.	Feasibility	Extension.
Do.	Novoshirokinskoye	Au	Highland Gold Mining Ltd.	Feasibility	Extension.
Do.	Pokrovskiy	Au	Peter Hambro Mining plc.	Producer	Extension.
Do.	Pioneer	Au	do.	Producer	Extension.
Do.	Prognoz/Glavnoye	Ag	High River Gold Mines Ltd.	Exploration	Continuing.
Do.	Svetloye	Cu, Au	Fortress Minerals Corp.	Exploration	Continuing.
Serbia	Plavkovo/Bukovik	Au, Cu	Eurasian Minerals Inc.	Exploration	New.
Do.	Stara Planina/Gradiste/Aldinac	Cu, Au	do.	Exploration	New.

See footnotes at end of table.

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TABLE 3—Continued
SELECTED EXPLORATION ACTIVITY IN EUROPE AND CENTRAL EURASIA IN 2006

Country	Site	Commodity[1]	Company	Phase[2]	Type[3]
Slovakia	Detva	Au, Cu	Eastern Mediterranean Resources Public Ltd.	Exploration	New.
Do.	Stiavnica-Hodrusa	Au, Ag	do.	Exploration	Continuing.
Do.	Zlatniky	Au	do.	Exploration	Continuing.
Spain	Aguas Tenidas	Cu, Zn, Pb, Ag, Au	PGM Ventures Corp.	Feasibility	Extension.
Do.	Corcoesto	Au	Kinbauri Gold Corp.	Exploration	Continuing.
Do.	La Zarza	Au, Cu, Ag	Ormonde Mining plc.	Exploration	Continuing.
Do.	Salamanca 1/Retortillo	Au	do.	Exploration	Continuing.
Do.	Valiña	Au	Dragon Mining NL	Exploration	New.
Sweden	Barsele Norra	Au	Northland Resources Inc.	Exploration	Continuing.
Do.	Bergslagen	Au	Tumi Resources Ltd.	Exploration	Continuing.
Do.	Bjorkdal	Au	Gold Ore Resources Ltd.	Developing	Extension.
Do.	Copperstone	Au, Cu	Lundin Mining Corp.	Exploration	New.
Do.	Fäboliden	Au	Lappland Goldminers AB	Feasibility	Extension.
Do.	Grundtrask	Au	Beowulf Mining plc.	Exploration	New.
Do.	Kalvbacken	Cu, Au	Tumi Resources Ltd.	Exploration	Continuing.
Do.	Palotieva	Cu, Au	Northland Resources Inc.	Exploration	New.
Do.	Rakkurijärvi	Au, Cu	Lundin Mining Corp.	Exploration	New.
Do.	Ruoutevare	Ti	Beowulf Mining plc.	Exploration	New.
Do.	Sala	Cu, Au	Tumi Resources Ltd.	Exploration	Continuing.
Do.	Stora Sahavaara	Fe, Cu	Northland Resources Inc.	Exploration	Continuing.
Do.	Storbodsund	Ni, Cu, Co	Mawson Resources Ltd.	Exploration	New.
Do.	Storliden	Au, Cu	Lundin Mining Corp.	Producer	Extension.
Do.	Svartliden	Au	Dragon Mining NL	Producer	Extension.
Do.	Vargbäcken	Au	Mawson Resources Ltd.	Exploration	Continuing.
Do.	Zinkgruvan-Bergslagen/Dalby	Cu, Zn, Pb	Lundin Mining Corp.	Producer	Extension.
Tajikistan	Hukas	Ni, Cu	Kryso Resources plc.	Exploration	New.
Do.	Pakrut	Au	do.	Exploration	Continuing.
Ukraine	Saulyak	Au	Eurogold Ltd.	Exploration	Continuing.
United Kingdom	Falkland Islands	Au	Falkland Gold and Minerals Corp.	Exploration	Continuing.
Do.	Parys Mountain/Garth Daniel	Cu, Zn	Angesey Mining plc.	Exploration	Continuing.
Uzbekistan	Amantaytau	Au, Ag	Oxus Gold plc.	Producer	Extension.

Do., do. Ditto.

[1]Abbreviations used for commodities in this table include the following: Ag, silver; Au, gold; Co, cobalt; Cr, chromium; Cu, copper; Fe, iron; Mo, molybdenum; Ni, nickel; Pb, lead; Pd, palladium; PGM, platinum-group metals; Pt, platinum; Ti, titanium; V, vanadium; W, tungsten; and Z, zinc.

[2]Phase of exploration activity has been separated into the following stages: Developing, includes construction and permitting; Exploration, exploration prior to full feasibility study; Feasibility, feasibility study ongoing or completed; Producer, exploration at producing site.

[3]Type reflects relative timeframe of exploration activity, such as: Continuing, exploration continued from previous year; Extension, extension of resource delineation; New, initial exploration by this company.

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TABLE 4

EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2006[1, 2]

(Thousand metric tons unless otherwise specified)

Region and/or country	Aluminum				Metals				
			Metal		Antimony, mine output, metal content	Chromite, mine output, gross weight	Copper		
	Alumina	Bauxite	Primary[3]	Secondary	(metric tons)		Mine, metal content	Metal, refined Primary[3]	Secondary
Central Eurasia and Europe:									
Central Eurasia: Commonwealth of Independent States (CIS):									
Armenia	--	--	--	--	--	--	15	--	--
Azerbaijan	363	--	32	--	--	--	--	--	--
Belarus	--	--	--	--	--	--	--	--	--
Georgia	--	--	--	--	--	--	12 e	--	--
Kazakhstan	1,514	4,800 e	--	--	--	3,600 e	457 e	408	--
Kyrgyzstan	--	--	--	--	50 e	--	--	--	--
Moldova	--	--	--	--	--	--	--	--	--
Russia	3,265	6,600 e	3,718	--	3,500 e	800 e	725 e	684	284
Tajikistan	--	--	414	--	2,000 e	--	--	--	--
Turkmenistan	--	--	--	--	--	--	--	--	--
Ukraine	1,672	--	92	130 e	--	--	--	--	--
Uzbekistan e	--	--	--	3	--	--	115	110	--
Total	6,810	11,400 e	4,260	133 e	5,550 e	4,400 e	1,320 e	1,200	284
Share of world total	9.7%	6.0%	12.5%	1.7%	3.1%	23.5%	8.7%	8.0%	11.7%
Europe:									
European Free Trade Association (EFTA):									
Iceland	--	--	328	--	--	--	--	--	--
Norway	--	--	1,422	349	--	--	--	40 e	--
Switzerland e	--	--	12	190	--	--	--	--	--
Total	--	--	1,760	539	--	--	--	40 e	--
Share of world total	--	--	5.2%	7.0%	--	--	--	0.3%	--
European Union (EU):									
Austria	--	--	--	150 e	--	--	--	--	73
Belgium	--	--	--	--	--	--	--	383	--
Bulgaria	--	--	--	2	--	--	101	66	--
Cyprus	--	--	--	--	--	--	--	1	--
Czech Republic	--	--	--	15 e	--	--	--	--	14
Denmark-Greenland	--	--	--	25 e	--	--	--	--	--
Estonia	--	--	--	--	--	--	--	--	--
Finland	--	--	--	46	--	549	15	137	--
France	200 e	168	442	222	500 e	--	--	--	--
Germany	1	--	516	796	--	--	--	312	350
Greece	775 e	2,163	165	3 e	--	--	--	--	--
Hungary	270 e	538	34	50 e	--	--	--	10 e	--

See footnotes at end of table.

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TABLE 4—Continued

EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2006[1, 2]

(Thousand metric tons unless otherwise specified)

Region and/or country	Metals								
	Aluminum				Antimony, mine output, metal content (metric tons)	Chromite, mine output, gross weight	Copper		
			Metal				Mine, metal content	Metal, refined	
	Alumina	Bauxite	Primary[3]	Secondary				Primary[3]	Secondary
Central Eurasia and Europe—Continued:									
Europe—Continued:									
European Union (EU)—Continued:									
Ireland	1,800 e	--	--	--	--	--	--	--	--
Italy	1,100 e	--	194	666	--	--	--	36	--
Latvia	--	--	--	--	--	--	--	--	--
Lithuania	--	--	--	--	--	--	--	--	--
Luxembourg	--	--	--	--	--	--	--	--	--
Malta	--	--	--	--	--	--	--	--	--
Netherlands	--	--	312	30 e	--	--	--	--	--
Poland	--	--	58	12 e	--	--	570 e	557	--
Portugal	--	--	--	18 e	--	--	79	--	--
Romania	650 e	--	258	7	--	--	12	22	2 e
Slovakia	161	--	180	--	--	--	(4)	--	--
Slovenia	--	--	140	--	--	--	--	--	--
Spain	1,000 e	--	349	243	--	--	9	255	35 e
Sweden	--	--	101	32	--	--	98 e	229	25 e
United Kingdom	--	--	360	198	--	--	--	--	--
Total	5,960	2,870	3,110	2,510	500 e	549	884	2,010	499
Share of world total	8.5%	1.5%	9.1%	32.6%	0.3%	2.9%	5.8%	13.4%	20.5%
Other Europe:									
Albania	--	--	--	--	--	210	(4) e	--	--
Bosnia and Herzegovina	350	817	136	--	--	--	--	--	--
Croatia	--	--	--	2	--	--	--	--	--
Macedonia	--	--	--	4 e	--	--	34	--	--
Montenegro	237	659	122	--	--	--	--	--	--
Serbia	--	--	--	1	--	--	25	35 e	6 e
Total	587	1,480	258	8	--	210	59	35 e	6 e
Share of world total	0.8%	0.8%	0.8%	0.1%	--	1.1%	0.4%	0.2%	0.2%
Total, Europe and Central Eurasia	13,400	15,700	9,380	3,190	6,050	5,160	2,270	3,280	789
Share of world total	19.1%	8.3%	27.5%	41.4%	3.4%	27.6%	14.9%	21.9%	32.4%
United States	5,220	NA	2,280	--	--	--	1,200	1,210	45
Share of world total	7.5%	NA	6.7%	--	--	--	7.9%	8.0%	1.8%
World total	67,000	190,000	34,100	7,710	176,000	18,700	15,200	15,000	2,440

See footnotes at end of table.

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TABLE 4—Continued

EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2006[1, 2]

(Thousand metric tons unless otherwise specified)

Region and/or country	Metals—Continued								
	Gold, mine output (kilograms)	Iron and steel: Iron ore, mine output, metal content	Iron and steel: Pig iron and direct-reduced iron	Iron and steel: Steel, crude	Lead: Mine output, metal content	Lead: Metal, refined: Primary[3]	Lead: Metal, refined: Secondary	Manganese ore, mine output, metal content	Mercury, mine output, metal content (metric tons)
Central Eurasia and Europe:									
Central Eurasia: Commonwealth of Independent States (CIS):									
Armenia	1,400	--	--	--	--	--	--	--	--
Azerbaijan	--	6 e	--	54	--	--	--	--	--
Belarus	--	--	--	2,200 e	--	--	--	--	--
Georgia	2,000 e	--	--	--	(4)	--	--	95 e	--
Kazakhstan	18,000 e	10,500 e	3,400 e	4,225	48 e	125	--	550 e	--
Kyrgyzstan	10,721	--	--	--	--	--	--	--	250 e
Moldova	--	--	--	675	--	--	--	--	--
Russia	159,340	59,100 e	55,023 e	70,766	36 e	78 e	--	24 e	50 e
Tajikistan e	3,000	--	--	--	1	--	--	--	30
Turkmenistan	--	--	--	--	--	--	--	--	--
Ukraine	--	40,700 e	32,926	40,899	--	--	6 e	820 e	--
Uzbekistan e	85,000	--	--	730	--	--	--	--	--
Total	279,000	110,000 e	91,300	120,000	85 e	203	6 e	1,490 e	330 e
Share of world total	11.4%	11.6%	8.8%	9.6%	2.3%	5.0%	0.2%	12.2%	29.0%
Europe:									
European Free Trade Association (EFTA):									
Iceland	--	--	--	--	--	--	--	--	--
Norway	--	400 e	100 e	679	--	--	--	--	--
Switzerland e	--	--	100	1,200	--	--	9	--	--
Total	--	400 e	200 e	1,880	--	--	9 e	--	--
Share of world total	--	(5)	(5)	0.2%	--	--	0.2%	--	--
European Union (EU):									
Austria	--	650 e	5,400 e	7,129	--	--	22 e	--	--
Belgium	--	--	8,000 e	11,631	--	--	97 e	--	--
Bulgaria	3,818	--	1,000	2,000	28	84	--	6 e	--
Cyprus	--	--	--	--	--	--	--	--	--
Czech Republic	--	--	5,131	6,862	--	--	26	--	--
Denmark-Greenland	--	--	--	--	--	--	--	--	--
Estonia	--	--	--	--	--	--	9 e	--	--
Finland	4,000 e	--	5,423	5,052	--	--	--	--	23
France	1,500	--	13,013	19,857	--	4	100	--	--
Germany	--	44	30,362	47,224	--	100	221	--	--
Greece	--	575	--	2,416	12	--	4 e	(4)	--
Hungary	--	--	1,335	2,029	--	--	--	5 e	--

See footnotes at end of table.

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TABLE 4—Continued

EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2006[1, 2]

(Thousand metric tons unless otherwise specified)

Region and/or country	Metals—Continued								
	Gold, mine output (kilograms)	Iron ore, mine output, metal content	Iron and steel: Pig iron and direct-reduced iron	Iron and steel: Steel, crude	Lead: Mine output, metal content	Lead: Metal, refined: Primary[3]	Lead: Metal, refined: Secondary	Manganese ore, mine output, metal content	Mercury, mine output, metal content (metric tons)
Central Eurasia and Europe—Continued:									
Europe—Continued:									
European Union (EU)—Continued:									
Ireland	--	--	--	--	62	--	22	--	--
Italy	--	--	11,535	31,550	1 e	35	156	1 e	--
Latvia	--	--	--	550 e	--	--	--	--	--
Lithuania	--	--	--	--	--	--	--	--	--
Luxembourg	--	--	--	2,802	--	--	--	--	--
Malta	--	--	--	--	--	--	--	--	--
Netherlands	--	--	5,417	6,372	--	--	17 e	--	--
Poland	500 e	--	5,533	9,992	94	67	--	--	--
Portugal	--	10 e	100 e	725	--	--	3 e	--	--
Romania	400 e	80	3,966	6,318	8	28 e	5 e	14	--
Slovakia	100	250	4,145	5,094	--	--	--	--	--
Slovenia	--	--	--	627	--	--	15	--	--
Spain	5,300	--	4,200	17,800	--	--	110	--	--
Sweden	4,500 e	16,000 e	3,500 e	5,435	74 e	25 e	40	--	--
United Kingdom	--	(4)	10,696	13,931	1 e	164	144	--	--
Total	20,100	17,600	119,000	205,000	279	508	991	25	23
Share of world total	0.8%	1.9%	11.4%	16.6%	7.6%	12.5%	26.9%	0.2%	2.0%
Other Europe:									
Albania	--	--	--	100 e	--	--	--	--	--
Bosnia and Herzegovina	--	1,700	60 e	469	1 e	(4) e	--	1 e	--
Croatia	--	--	--	81	--	--	--	--	--
Macedonia	700 e	6	--	326	16	--	--	--	--
Montenegro	--	--	--	50	--	--	--	--	--
Serbia	400 e	--	1,529	1,837	2 e	1 e	--	--	--
Total	1,100 e	1,710	1,590	2,860	19	1 e	--	1 e	--
Share of world total	0.0%	0.2%	0.2%	0.2%	0.5%	(5)	--	(5)	--
Total, Europe and Central Eurasia	301,000	130,000	212,000	330,000	383	712	1,010	1,520	353
Share of world total	12.3%	13.7%	20.4%	26.6%	10.5%	17.5%	27.3%	12.4%	31.0%
United States	252,000	33,300	38,100	98,200	429	153	1,160	--	NA
Share of world total	10.3%	3.5%	3.7%	7.9%	11.7%	3.8%	31.5%	--	NA
World total	2,450,000	948,000	1,040,000	1,240,000	3,660	4,080	3,680	12,200	1,140

See footnotes at end of table.

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TABLE 4—Continued

EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2006[1, 2]

(Thousand metric tons unless otherwise specified)

Region and/or country	Metals—Continued								
	Nickel		Platinum-group metals, refined, primary and secondary		Silver, mine output, metal content (metric tons)	Tin		Titanium	
	Mine output, metal content	Refinery products, metal content	Palladium (kilograms)	Platinum (kilograms)		Mine output, metal content (metric tons)	Metal, primary[3] (metric tons)	Ilmenite, TiO_2 content (metric tons)	Metal sponge, metal content (metric tons)
Central Eurasia and Europe:									
Central Eurasia: Commonwealth of Independent States (CIS):									
Armenia	--	--	--	--	4 e	--	--	--	--
Azerbaijan	--	--	--	--	--	--	--	--	--
Belarus	--	--	--	--	--	--	--	--	--
Georgia	--	--	--	--	33 e	--	--	--	--
Kazakhstan	--	(4)	--	--	830 e	--	--	15,000	23,000
Kyrgyzstan	--	--	--	--	--	--	--	--	--
Moldova	--	--	--	--	--	--	--	--	--
Russia e	320	295	98,400	29,000	1,300	3,000	4,980	--	32,000
Tajikistan	--	--	--	--	5 e	--	--	--	--
Turkmenistan	--	--	--	--	--	--	--	--	--
Ukraine	12 e	18 e	--	--	--	--	--	287,000 e	9,997
Uzbekistan	--	--	--	--	83 e	--	--	--	--
Total	332 e	313 e	98,400 e	29,000 e	2,260 e	3,000 e	4,980 e	302,000	65,000
Share of world total	15.6%	22.5%	44.8%	9.2%	11.2%	1.0%	1.5%	6.0%	78.2%
Europe:									
European Free Trade Association (EFTA):									
Iceland	--	--	--	--	--	--	--	--	--
Norway	(4)	82 e	--	--	--	--	--	385,000 e	--
Switzerland	--	--	--	--	--	--	--	--	--
Total	(4)	82 e	--	--	--	--	--	385,000 e	--
Share of world total	(5)	5.9%	--	--	--	--	--	7.6%	--
European Union (EU):									
Austria	--	--	--	--	--	--	--	--	--
Belgium	--	--	--	--	--	--	--	--	--
Bulgaria	--	--	--	--	60	--	10 e	--	--
Cyprus	--	--	--	--	--	--	--	--	--
Czech Republic	--	--	--	--	25 e	--	--	--	--
Denmark-Greenland	--	--	--	--	--	--	--	--	--
Estonia	--	--	--	--	--	--	--	--	--
Finland	3	42	--	1,000 e	38 e	--	--	--	--
France	--	14	--	--	1 e	--	--	--	--
Germany	--	--	--	100,000 e	--	--	5,016	--	--
Greece	22	18	--	--	26	--	--	--	--
Hungary	--	--	--	--	--	--	--	--	--

See footnotes at end of table.

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TABLE 4—Continued

EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2006[1, 2]

(Thousand metric tons unless otherwise specified)

	Metals—Continued								
	Nickel		Platinum-group metals, refined, primary and secondary		Silver, mine	Tin		Titanium	
Region and/or country	Mine output, metal content	Refinery products, metal content	Palladium (kilograms)	Platinum (kilograms)	output, metal content (metric tons)	Mine output, metal content (metric tons)	Metal, primary[3] (metric tons)	Ilmenite, TiO_2 content (metric tons)	Metal sponge, metal content (metric tons)
Central Eurasia and Europe—Continued:									
Europe—Continued:									
European Union (EU)—Continued:									
Ireland	--	--	--	--	13	--	--	--	--
Italy	--	--	--	--	(4)	--	--	--	--
Latvia	--	--	--	--	--	--	--	--	--
Lithuania	--	--	--	--	--	--	--	--	--
Luxembourg	--	--	--	--	--	--	--	--	--
Malta	--	--	--	--	--	--	--	--	--
Netherlands	--	--	--	--	--	--	--	--	--
Poland[e]	--	--	10	20	1,300	--	--	--	--
Portugal	--	--	--	--	20	25	--	--	--
Romania	--	--	--	--	18	--	--	--	--
Slovakia	--	--	--	--	--	--	--	--	--
Slovenia	--	--	--	--	--	--	--	--	--
Spain	6	--	--	--	4 [e]	--	--	--	--
Sweden	--	(4)	--	--	268	--	--	--	--
United Kingdom	--	37	--	--	--	--	--	--	--
Total	31	110	10 [e]	101,000 [e]	1,770	25	5,030	--	--
Share of world total	1.5%	7.9%	(5)	32.0%	8.8%	(5)	1.6%	--	--
Other Europe:									
Albania	--	--	--	--	--	--	--	--	--
Bosnia and Herzegovina	--	--	--	--	--	--	--	--	--
Croatia	--	--	--	--	--	--	--	--	--
Macedonia	--	11	--	--	--	--	--	--	--
Montenegro	--	--	--	--	--	--	--	--	--
Serbia[e]	--	--	8	1	2	--	--	--	--
Total	--	11	8 [e]	1 [e]	2 [e]	--	--	--	--
Share of world total	--	0.8%	(5)	(5)	(5)	--	--	--	--
Total, Europe and Central Eurasia	363	516	98,400	130,000	4,030	3,030	10,000	687,000	65,000
Share of world total	17.1%	37.1%	44.8%	41.2%	20.1%	1.0%	3.1%	13.5%	78.2%
United States	--	--	14,400	4,290	1,140	--	--	273,000	--
Share of world total	--	--	6.6%	1.4%	5.7%	--	--	5.4%	--
World total	2,130	1,390	220,000	316,000	20,000	293,000	324,000	5,070,000	83,100

See footnotes at end of table.

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TABLE 4—Continued

EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2006[1, 2]

(Thousand metric tons unless otherwise specified)

Region and/or country	Metals—Continued			Industrial minerals					
	Zinc								
	Tungsten, mine output, metal content (metric tons)	Mine output, metal content (metric tons)	Metal, primary and secondary (metric tons)	Ammonia, N content	Cement, hydraulic	Diamond, natural, gemstones and industrial (thousand carats)	Phosphate rock, P_2O_5 content	Potash, K_2O equivalent	Salt
Central Eurasia and Europe:									
Central Eurasia: Commonwealth of Independent States (CIS):									
Armenia	--	2,270	--	--	625	--	--	--	37 e
Azerbaijan	--	--	--	--	1,622	--	--	--	12
Belarus	--	--	--	850 e	3,495	--	--	4,605	1,900 e
Georgia e	--	400	--	140	450	--	--	--	30
Kazakhstan e	--	400,000	349,000	--	4,200	--	55	--	--
Kyrgyzstan	--	--	--	--	1,216	--	--	--	1 e
Moldova	--	--	--	--	837	--	--	--	--
Russia	4,000 e	190,000 e	240,000 e	10,500	54,700	38,400 e	4,220 e	5,720 e	2,900 e
Tajikistan	--	--	--	45 e	282	--	--	--	52
Turkmenistan e	--	--	--	90	800	--	--	--	215
Ukraine	--	--	--	4,200 e	13,732	--	--	65 e	5,996
Uzbekistan e	--	--	35,000	870	5,000	--	140	--	--
Total	4,000 e	593,000	624,000 e	16,700	87,000	38,400 e	4,420 e	10,400	11,100
Share of world total	5.1%	5.9%	5.9%	13.1%	3.5%	21.9%	9.3%	33.9%	4.3%
Europe:									
European Free Trade Association (EFTA):									
Iceland	--	--	--	--	141	--	--	--	5 e
Norway	--	--	160,700	350 e	1,850 e	--	--	--	--
Switzerland e	--	--	--	30	4,000	--	--	--	560
Total	--	--	160,700	380 e	5,990	--	--	--	565 e
Share of world total	--	--	1.5%	0.3%	0.2%	--	--	--	0.2%
European Union (EU):									
Austria e	1,300	--	--	(4)	4,700	--	--	--	1,030
Belgium	--	--	259,800 e	860 e	8,192	--	--	--	--
Bulgaria	--	13,500 e	85,900	309	2,000	--	--	--	2,000
Cyprus	--	--	--	--	1,786	--	--	--	--
Czech Republic	--	--	250 e	250 e	3,900	--	--	--	--
Denmark-Greenland e	--	--	--	2	2,060	--	--	--	600
Estonia	--	--	--	170 e	849	--	--	--	--
Finland	--	66,109	282,238	91	1,513	--	300 e	--	--
France	--	--	120,000	616 e	21,000 e	--	--	--	9,371
Germany	--	--	342,566	2,718	33,516	--	--	3,625	19,846
Greece	--	16,414	--	130 e	15,000 e	--	--	--	195 e
Hungary	--	--	--	275 e	3,349	--	--	--	--

See footnotes at end of table.

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TABLE 4—Continued

EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2006[1, 2]

(Thousand metric tons unless otherwise specified)

Region and/or country	Metals—Continued			Industrial minerals					
		Zinc							
	Tungsten, mine output, metal content (metric tons)	Mine output, metal content (metric tons)	Metal, primary and secondary (metric tons)	Ammonia, N content	Cement, hydraulic	Diamond, natural, gemstones and industrial (thousand carats)	Phosphate rock, P_2O_5 content	Potash, K_2O equivalent	Salt
Central Eurasia and Europe—Continued:									
Europe—Continued:									
European Union (EU)—Continued:									
Ireland	--	425,800	--	--	4,700	--	--	--	--
Italy	--	--	109,200	500 e	43,234	--	--	--	3,438
Latvia	--	--	--	--	280 e	--	--	--	--
Lithuania	--	--	--	453	1,065	--	--	--	--
Luxembourg	--	--	--	--	700 e	--	--	--	--
Malta	--	--	--	--	--	--	--	--	6 e
Netherlands	--	--	235,913	1,800 e	2,400 e	--	--	--	5,000 e
Poland	--	126,000	134,000	2,100 e	14,688	--	--	--	4,955
Portugal	780	--	7,505	244 e	9,000 e	--	--	--	586
Romania	--	9,574	43,705	2,000	7,000	--	--	--	2,619
Slovakia	--	--	--	300 e	3,593	--	--	--	100 e
Slovenia	--	--	--	--	1,500 e	--	--	--	2
Spain	--	--	502,800	400 e	50,000	--	--	580 e	4,600 e
Sweden	--	208,551	--	--	2,600 e	--	--	--	--
United Kingdom	--	--	--	1,100	11,400	--	--	420	5,800 e
Total	2,080	866,000	2,120,000	14,300	250,000	--	300 e	4,630	60,100
Share of world total	2.6%	8.6%	20.0%	11.2%	9.9%	--	0.6%	15.1%	23.0%
Other Europe:									
Albania	--	--	--	--	600 e	--	--	--	25 e
Bosnia and Herzegovina	--	300 e	--	1 e	1,226	--	--	--	416
Croatia	--	--	--	400 e	3,633	--	--	--	30
Macedonia	--	21,700	--	--	800 e	--	--	--	--
Montenegro	--	--	--	--	--	--	--	--	5
Serbia	--	2,100	4,000 e	80 e	2,565	--	--	--	75 e
Total	--	24,100	4,000 e	481 e	8,820	--	--	--	551
Share of world total	--	0.2%	(5)	0.4%	0.4%	--	--	--	0.2%
Total, Europe and Central Eurasia	6,080	1,480,000	2,910,000	31,900	352,000	38,400	4,720	15,000	72,400
Share of world total	7.7%	14.7%	27.4%	25.0%	14.0%	21.9%	10.0%	49.1%	27.7%
United States	--	727,000	269,000	8,520	99,700	--	8,680	1,100	44,300
Share of world total	--	7.2%	2.5%	6.7%	4.0%	--	18.3%	3.6%	17.0%
World total	78,900	10,100,000	10,600,000	128,000	2,520,000	175,000	47,400	30,600	261,000

See footnotes at end of table.

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TABLE 4—Continued

EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2006[1, 2]

(Thousand metric tons unless otherwise specified)

Region and/or country	Mineral fuels and related materials					
	Coal			Natural gas, dry (million cubic meters)	Petroleum, crude (thousand 42-gallon barrels)	Uranium, U_3O_8 content (metric tons)
	Anthracite	Bituminous	Lignite			
Central Eurasia and Europe:						
Central Eurasia: Commonwealth of Independent States (CIS):						
Armenia	--	--	--	1,596 [p]	--	--
Azerbaijan	--	--	--	6,080	236,000 [e]	--
Belarus	--	--	--	220	13,100 [e]	--
Georgia	--	8	--	21	466 [e]	--
Kazakhstan	--	93,082	3,239	14,440	476,000 [e]	6,226
Kyrgyzstan	--	77	238	19	518 [e]	--
Moldova	--	--	--	56 [p]	--	--
Russia	18,000	215,000	75,800	656,230	3,530,000 [e]	3,762
Tajikistan	--	102	--	20	164 [e]	--
Turkmenistan	--	--	--	65,000	66,100 [e]	--
Ukraine	16,592	59,000 [e]	232	21	32,300 [e]	943
Uzbekistan	--	82	3,039	58,000 [e]	39,700 [e]	2,665
Total	34,600	367,000	82,500	802,000	4,390,000 [e]	13,600
Share of world total	5.6%	8.3%	8.5%	28.5%	16.2%	30.6%
Europe:						
European Free Trade Association (EFTA):						
Iceland	--	--	--	--	--	--
Norway [e]	--	300	--	84,000	965,000	--
Switzerland	--	--	--	--	--	--
Total [e]	--	300	--	84,000	965,000	--
Share of world total	--	(5)	--	3.0%	3.6%	--
European Union (EU):						
Austria [e]	--	--	5	1,200	6,500	--
Belgium	--	--	--	--	--	--
Bulgaria	--	52	25,307	519	184 [e]	708 [e]
Cyprus	--	--	--	--	--	--
Czech Republic	--	13,017	49,374	148	1,600	422
Denmark-Greenland	--	--	--	9,200	140,000	--
Estonia	--	--	14,188	--	--	--
Finland	--	--	--	--	--	--
France	--	--	--	1,400	7,775	--
Germany	1,963	18,919	176,324	18,443	25,800	77
Greece [e]	--	--	74,000	16	760	--

See footnotes at end of table.

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TABLE 4—Continued

EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2006[1, 2]

(Thousand metric tons unless otherwise specified)

Region and/or country	Mineral fuels and related materials					
	Coal			Natural gas, dry (million cubic meters)	Petroleum, crude (thousand 42-gallon barrels)	Uranium, U_3O_8 content (metric tons)
	Anthracite	Bituminous	Lignite			
Central Eurasia and Europe—Continued:						
Europe—Continued:						
European Union (EU)—Continued:						
Hungary	--	--	9,898	3	6,800 e	--
Ireland	--	--	--	535	--	--
Italy	--	--	--	11,000	29,600	--
Latvia	--	--	--	1,876 p	--	--
Lithuania	--	--	--	2,884 p	1,330 e	--
Luxembourg	--	--	--	--	--	--
Malta	--	--	--	--	--	--
Netherlands	--	--	--	73,300	11,426	--
Poland	--	95,220	60,844	5,650	5,850 e	--
Portugal	--	--	--	--	--	--
Romania	--	--	30,050 e	12,700	40,000	--
Slovakia	--	--	2,500	--	350 e	--
Slovenia	--	--	4,521	4	2,090 e	--
Spain	8,354	3,223	6,822	330 e	1,300 e	--
Sweden	--	--	--	--	--	--
United Kingdom	1,630 e	18,400 e	--	80,000	597,140	--
Total	11,900	149,000	454,000	219,000	878,000	1,210
Share of world total	1.9%	3.4%	46.6%	7.8%	3.2%	2.7%
Other Europe:						
Albania e	--	--	13	11	2,940	--
Bosnia and Herzegovina	--	--	9,965	--	--	--
Croatia	--	--	--	2,714	6,980 e	--
Macedonia	--	--	6,650	--	--	--
Montenegro	--	--	1,502	--	--	--
Serbia	--	65	36,720	280	4,800 e	--
Total	--	65	54,900	3,010	14,700 e	--
Share of world total	--	(5)	5.6%	0.1%	0.1%	--
Total, Europe and Central Eurasia	46,500	517,000	591,000	1,110,000	6,250,000	14,800
Share of world total	7.5%	11.7%	60.8%	39.4%	23.1%	33.4%
United States	1,370	976,000	76,400	525,000	1,860,000	1,970
Share of world total	0.2%	22.1%	7.9%	18.6%	6.9%	4.4%
World total	618,000	4,420,000	973,000	2,820,000	27,100,000	44,400

See footnotes at end of table.

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TABLE 4—Continued

EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2006[1, 2]

[e]Estimated; estimated data, U.S. data, and world totals are rounded to no more than three significant digits; may not add to totals shown. NA Not available. -- Zero or Zero percent.

[1]Some of the individual entries in this table may differ from those that appear in individual country production tables elsewhere in this volume owing to the inclusion in this table of data received at a later date.

[2]Totals may not add due to independent rounding. Table includes data available as of June 11, 2008.

[3]Primary production also includes undifferentiated (primary and secondary) production for some countries listed.

[4]Less than 1/2 unit.

[5]Less than 0.5 percent.

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TABLE 5

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED BAUXITE MINE PRODUCTION, 1995-2013[1]

(Thousand metric tons)

Region and country	1995	2000	2005	2006	2009[e]	2011[e]	2013[e]
Europe:							
Western Europe:							
France	75	185	168	168	--	--	--
Greece	2,200	1,966	2,441	2,163	2,200	2,200	2,200
Italy	11	300	300	--	--	--	--
Total	2,290	2,450	2,910	2,330	2,200	2,200	2,200
Central Europe:							
Albania	--	5	--	--	--	--	5
Bosnia and Herzegovina	75	255	1,032	817	950	1,000	1,000
Croatia	2	--	--	--	--	--	--
Hungary	1,015	1,046	535	538	600	600	600
Montenegro[2]	60	630	672	659	700	800	800
Romania	175	--	--	--	--	--	--
Total	1,330	1,940	2,240	2,010	2,300	2,400	2,400
Central Eurasia:							
Kazakhstan	3,071	3,729	4,800	4,800	5,200	5,500	6,000
Russia	3,800	5,274	6,400	6,600	7,500	8,000	10,000
Total	6,870	9,000	11,200	11,400	13,000	14,000	16,000
Regional total	10,500	13,400	16,300	15,700	17,000	18,000	21,000

[e]Estimated. -- Zero.

[1]Projections, estimated data, and totals are rounded to no more than three significant digits; may not add to totals shown.

[2]Prior to 2005, data are for a combined Serbia and Montenegro.

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TABLE 6

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PRIMARY AND SECONDARY ALUMINUM PRODUCTION, 1995-2013[1]

(Thousand metric tons)

Region and country	1995	2000	2005	2006	2009[e]	2011[e]	2013[e]
Europe:							
Western Europe:							
Austria	94	158	151	150	150	150	150
Belgium	4	1	--	--	--	--	--
Denmark-Greenland	14	16	20	25	25	25	25
Finland	35	45	34	46	45	45	45
France	603	701	664	664	600	600	600
Germany	994	1,216	1,366	1,311	1,400	1,400	1,400
Greece	133	171	166	168	160	150	150
Iceland	100	224	273	328	500	600	600
Italy	610	848	847	860	900	900	900
Netherlands	407	421	391	342	350	350	350
Norway	902	1,280	1,739	1,771	1,800	1,800	1,800
Portugal	NA	18	18	18	18	18	18
Spain	468	606	637	592	650	650	650
Sweden	118	127	133	133	140	140	140
Switzerland	31	224	238	202	200	200	200
United Kingdom	520	590	574	558	550	550	550
Total	5,030	6,650	7,250	7,170	7,500	7,600	7,600
Central Europe:							
Bosnia and Herzegovina	15	95	131	136	145	175	200
Bulgaria	5	8	2	2	2	2	2
Croatia	31	15	6	2	--	--	--
Czech Republic	48	40	15	15	50	50	50
Hungary	29	89	81	84	100	100	100
Macedonia	4	5	4	4	10	10	10
Montenegro[2]	17	88	117	122	120	120	120
Poland	56	52	67	70	75	75	75
Romania	144	181	251	265	260	260	260
Serbia	NA	NA	(3)	1	2	2	2
Slovakia	38	137	158	180	190	190	190
Slovenia	58	84	139	140	140	140	140
Total	444	794	971	1,020	1,100	1,100	1,100
Central Eurasia:							
Azerbaijan	4	--	32	32	60	110	150
Kazakhstan	--	--	--	--	120	200	300
Russia	2,724	3,245	3,647	3,718	4,300	4,500	5,000
Tajikistan	232	269	380	414	500	500	500
Ukraine	98	233	244	222	120	120	120
Uzbekistan	3	2	3	3	3	3	3
Total	3,060	3,750	4,310	4,390	5,100	5,400	6,100
Regional total	8,540	11,200	12,500	12,600	14,000	14,000	15,000

[e]Estimated. NA Not available. -- Zero.

[1]Projections, estimated data, and totals are rounded to no more than three significant digits; may not add to totals shown.

[2]Prior to 2005, data are for a combined Serbia and Montenegro.

[3]Less than 1/2 unit.

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TABLE 7

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED COPPER MINE PRODUCTION, 1995-2013[1]

(Cu content in thousand metric tons)

Region and country	1995	2000	2005	2006	2009[e]	2011[e]	2013[e]
Europe:							
Western Europe:							
Finland	10	14	16	15	16	16	15
France	(2)	(2)	--	--	--	--	--
Norway	7	--	--	--	--	--	--
Portugal	134	76	90	79	90	90	90
Spain	25	23	8	9	9	9	9
Sweden	84	78	98	98	50	45	40
Total	259	192	211	200	170	160	150
Central Europe:							
Albania	4	--	2	(2)	(2)	(2)	--
Bulgaria	76	92	94	101	110	120	120
Macedonia	6	6	22	34	40	45	50
Poland	384	509	533	570	570	560	550
Romania	25	16	15	12	25	25	25
Serbia[3]	75	56	26	25	50	75	75
Slovakia	--	(2)	(2)	(2)	--	--	--
Total	569	679	692	742	800	830	820
Central Eurasia:							
Armenia	8	12	16	15	20	30	40
Georgia	5	8	12	12	20	30	35
Kazakhstan	200	430	422	457	500	550	600
Russia	525	570	700	725	800	900	1,000
Uzbekistan	40	70	110	115	120	130	140
Total	778	1,090	1,260	1,320	1,500	1,600	1,800
Regional total	1,610	1,960	2,160	2,270	2,400	2,600	2,800

[e]Estimated. -- Zero.

[1]Projections, estimated data, and totals are rounded to no more than three significant digits; may not add to totals shown.

[2]Less than 1/2 unit.

[3]Prior to 2005, data are for a combined Serbia and Montenegro.

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TABLE 8

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PRIMARY AND SECONDARY REFINED COPPER PRODUCTION, 1995-2013[1]

(Thousand metric tons)

Region and country	1995	2000	2005	2006	2009[e]	2011[e]	2013[e]
Europe:							
Western Europe:							
Austria	54	79	72	73	70	70	70
Belgium	376	423	383	383	400	400	400
Cyprus	--	5	--	1	--	--	--
Finland	74	114	125	137	140	140	140
France	42	2	--	--	--	--	--
Germany	616	710	638	662	660	660	660
Italy	98	73	32	36	40	40	40
Norway	34	27	39	40	40	40	40
Spain	164	316	302	290	320	320	320
Sweden	105	130	222	254	260	270	270
United Kingdom	55	3	--	--	--	--	--
Total	1,620	1,880	1,810	1,880	1,900	1,900	1,900
Central Europe:							
Albania	3	--	--	--	--	--	--
Bulgaria	29	32	61	66	90	90	120
Czech Republic	20	20	14	14	20	20	20
Hungary	11	12	10	10	5	5	5
Poland	407	486	560	557	550	550	550
Romania	27	19	23	24	30	30	30
Serbia[2]	79	46	31	41	50	60	60
Slovakia	29	--	--	--	--	--	--
Total	604	615	699	712	750	760	790
Central Eurasia:							
Kazakhstan	256	395	388	408	450	500	550
Russia	560	840	933	968	1,000	1,100	1,200
Uzbekistan	95	85	104	110	115	120	125
Total	911	1,320	1,430	1,490	1,600	1,700	1,900
Regional total	3,130	3,820	3,940	4,070	4,200	4,400	4,600

[e]Estimated. -- Zero.

[1]Projections, estimated data, and totals are rounded to no more than three significant digits; may not add to totals shown.

[2]Prior to 2005, data are for a combined Serbia and Montenegro.

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TABLE 9

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED GOLD MINE PRODUCTION, 1995-2013[1]

(Kilograms)

Region and country	1995	2000	2005	2006	2009[e]	2011[e]	2013[e]
Europe:							
Western Europe:							
Finland	2,061	4,951	3,747	4,000	3,500	4,000	4,000
France	4,615	2,632	1,500	1,500	1,500	1,500	1,500
Italy	--	791	--	--	--	--	--
Spain	4,131	4,310	5,300	5,300	5,500	5,500	5,500
Sweden	6,528	3,570	6,600	4,500	5,800	6,000	6,000
Total	17,300	16,300	17,100	15,300	16,000	17,000	17,000
Central Europe:							
Bulgaria	3,100	2,347	3,868	3,818	4,000	4,000	4,200
Macedonia	760	750	750	700	700	700	700
Poland	510	367	530	500	450	450	450
Romania	4,000	500	400	400	2,000	5,000	10,000
Serbia[2]	3,040	1,121	400	400	1,000	1,000	1,500
Slovakia	518	306	109	100	100	100	100
Total	11,900	5,390	6,060	5,920	8,300	11,000	17,000
Central Eurasia:							
Armenia	514	600	1,400	1,400	3,500	4,000	4,500
Georgia	500	2,924	2,000	2,000	3,500	4,000	4,000
Kazakhstan	18,200	28,171	18,062	18,000	20,000	22,000	25,000
Kyrgyzstan	1,500	22,000	16,700	10,721	17,000	19,000	20,000
Russia	131,900	142,738	163,186	159,340	170,000	170,000	180,000
Tajikistan	1,500	2,700	3,000	3,000	3,500	4,000	6,000
Uzbekistan	65,000	85,000	90,000	85,000	100,000	100,000	110,000
Total	219,000	284,000	294,000	279,000	320,000	320,000	350,000
Regional total	248,000	306,000	318,000	301,000	340,000	350,000	380,000

[e]Estimated. -- Zero.

[1]Projections, estimated data, and totals are rounded to no more than three significant digits; may not add to totals shown.

[2]Prior to 2005, data are for a combined Serbia and Montenegro.

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TABLE 10

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED IRON ORE MINE PRODUCTION, 1995-2013[1]

(Fe content in thousand metric tons)

Region and country	Average iron content	1995	2000	2005	2006	2009[e]	2011[e]	2013[e]
Europe:								
Western Europe:								
Austria	33%	709	586	655	650	650	650	650
France	28%	432	--	--	--	--	--	--
Germany[2]	14%	10	65	38	44	50	50	50
Greece	38%	800	575	575	575	580	500	500
Norway	62%	1,348	369	420	400	340	320	300
Portugal	36%	5	12	10	10	10	10	10
Spain	38%	960	--	--	--	--	--	--
Sweden	65%	13,880	13,556	15,300	16,000	17,000	17,000	17,000
United Kingdom	54%	1	1	(3)	(3)	(3)	(3)	(3)
Total	XX	18,100	15,200	17,000	17,700	19,000	19,000	19,000
Central Europe:								
Bosnia and Herzegovina	53%	52	182	1,500	1,700	1,800	1,900	2,000
Bulgaria	50%	265	178	--	--	--	--	--
Czech Republic	29%	10	6	--	--	--	--	--
Macedonia	40%	1	9	--	--	--	--	--
Romania	52%	147	55	69	--	--	--	--
Serbia and Montenegro	45%	61	1	--	--	--	--	--
Slovakia	34%	225	255	259	250	250	250	250
Total	XX	761	686	1,830	1,950	2,100	2,200	2,300
Central Eurasia:								
Azerbaijan	57%	1	--	4	6	20	25	40
Kazakhstan	57%	8,500	9,200	9,300	10,500	12,000	13,000	14,000
Russia	58%	46,000	50,000	56,100	59,100	62,000	64,000	66,000
Ukraine	55%	29,000	30,600	37,700	40,700	45,000	47,000	48,000
Total	XX	83,500	89,800	103,000	110,000	120,000	120,000	130,000
Regional total	XX	102,000	106,000	122,000	130,000	140,000	140,000	150,000

[e]Estimated. XX Not applicable. -- Zero.

[1]Projections, estimated data, and totals are rounded to no more than three significant digits; may not add to totals shown.

[2]Iron ore is used domestically as an additive in cement and other construction materials but is of too low a grade to use in the steel industry.

[3]Less than 1/2 unit.

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TABLE 11

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED CRUDE STEEL PRODUCTION, 1995-2013[1]

(Thousand metric tons)

Region and country	1995	2000	2005	2006	2009[e]	2011[e]	2013[e]
Europe:							
Western Europe:							
Austria	4,537	5,725	7,031	7,129	7,100	7,100	7,100
Belgium	11,606	11,635	10,420	11,631	12,000	12,000	12,000
Denmark-Greenland	654	803	--	--	--	--	--
Finland	3,176	4,096	4,738	5,052	5,000	5,000	5,000
France	18,096	21,002	19,481	19,857	20,000	20,000	20,000
Germany	42,051	46,376	44,524	47,224	48,000	48,000	48,000
Greece	939	1,088	2,266	2,416	2,500	2,500	2,500
Ireland	309	342	--	--	--	--	--
Italy	27,766	26,544	29,061	31,550	34,000	34,000	34,000
Luxembourg	2,613	2,571	2,194	2,802	2,800	2,800	2,800
Netherlands	6,409	5,667	6,919	6,372	6,500	6,500	6,500
Norway	503	620	701	679	700	700	700
Portugal	829	1,097	725	725	800	800	800
Spain	13,975	15,844	17,800	17,800	17,000	17,000	17,000
Sweden	4,953	5,227	5,692	5,435	5,500	5,500	5,500
Switzerland	1,000	1,020	1,158	1,200	1,200	1,200	1,200
United Kingdom	17,604	15,306	13,210	13,931	14,000	14,000	14,000
Total	157,000	165,000	166,000	174,000	180,000	180,000	180,000
Central Europe:							
Albania	22	65	87	100	100	100	100
Bosnia and Herzegovina	--	134	283	469	600	700	800
Bulgaria	2,724	2,023	1,969	2,000	2,200	2,500	2,500
Croatia	45	71	74	81	85	85	90
Czech Republic	7,189	6,216	6,189	6,862	7,000	7,000	7,000
Hungary	1,865	1,969	1,962	2,029	2,000	2,000	2,000
Macedonia	33	161	321	326	350	350	350
Montenegro	NA	NA	28	50	50	50	50
Poland	11,890	10,508	8,336	9,992	10,000	10,000	10,000
Romania	6,557	4,672	5,632	6,318	6,500	6,500	6,500
Serbia[2]	180	682	1,286	1,837	2,000	2,000	2,000
Slovakia	3,958	3,733	4,242	5,094	5,500	5,500	5,500
Slovenia	407	519	583	627	650	650	650
Total	34,900	30,800	31,000	35,800	37,000	37,000	38,000
Central Eurasia:							
Azerbaijan	12	--	286	54	275	300	300
Belarus	744	1,623	2,076	2,200	2,500	2,500	2,500
Georgia	84	(3)	--	--	--	200	200
Kazakhstan	3,030	4,770	4,452	4,225	5,700	5,800	5,900
Latvia	279	500	550	550	550	550	550
Moldova	663	909	1,000	675	1,100	1,200	1,200
Russia	51,600	59,097	66,186	70,766	74,000	76,000	78,000
Ukraine	23,309	31,780	38,636	40,899	43,000	44,000	45,000
Uzbekistan	352	420	607	730	750	800	800
Total	80,100	99,100	114,000	120,000	130,000	130,000	130,000
Regional total	272,000	295,000	311,000	330,000	340,000	350,000	350,000

[e]Estimated. NA Not available. -- Zero.

[1]Projections, estimated data, and totals are rounded to no more than three significant digits; may not add to totals shown.

[2]Prior to 2005, data are for a combined Serbia and Montenegro.

[3]Less than 1/2 unit.

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TABLE 12

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED LEAD MINE PRODUCTION, 1995-2013[1]

(Pb content in metric tons)

Region and country	1995	2000	2005	2006	2009[e]	2011[e]	2013[e]
Europe:							
Western Europe:							
Greece	14,300	18,235	3,000	12,400	16,000	18,000	18,000
Ireland	46,100	57,825	63,810	61,800	60,000	60,000	60,000
Italy	15,142	2,000	800	800	--	--	--
Spain	30,300	40,300	--	--	--	--	--
Sweden	137,200	106,584	60,400	74,300	60,000	30,000	30,000
United Kingdom	1,600	1,000	500	500	500	300	200
Total	245,000	226,000	129,000	150,000	140,000	110,000	110,000
Central Europe:							
Bosnia and Herzegovina	150	200	850	850	850	800	800
Bulgaria	33,000	10,500	22,000	18,000	30,000	30,000	30,000
Macedonia	17,000	24,000	--	15,600	15,000	15,000	15,000
Poland	99,400	113,800	115,800	94,000	90,000	85,000	80,000
Romania	23,194	18,750	11,610	7,500	7,000	7,000	7,000
Serbia[2]	3,342	10,500	1,600	1,900	2,000	2,000	2,000
Total	176,000	178,000	152,000	138,000	140,000	140,000	130,000
Central Eurasia:							
Georgia	NA	200	400	400	450	500	600
Kazakhstan	40,000	40,000	44,000	48,000	49,000	55,000	60,000
Russia	23,000	13,300	36,000	36,000	38,000	40,000	42,000
Tajikistan	500	800	800	800	1,000	1,000	1,000
Total	63,500	54,300	81,200	85,200	88,000	97,000	100,000
Regional total	484,000	458,000	362,000	373,000	370,000	340,000	350,000

[e]Estimated. NA Not available. -- Zero.

[1]Projections, estimated data, and totals are rounded to no more than three significant digits; may not add to totals shown.

[2]Prior to 2005, data are for a combined Serbia and Montenegro.

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TABLE 13

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PRIMARY AND SECONDARY REFINED LEAD PRODUCTION, 1995-2013[1]

(Metric tons)

Region and country	1995	2000	2005	2006	2009[e]	2011[e]	2013[e]
Europe:							
Western Europe:							
Austria	21,919	24,000	22,000	22,000	22,000	22,000	22,000
Belgium	122,000	119,000	103,000	97,200	110,000	110,000	110,000
France	297,000	268,094	104,979	104,234	90,000	90,000	90,000
Germany	313,900	373,989	341,710	321,500	350,000	350,000	350,000
Greece	5,000	5,000	4,000	4,000	11,000	11,000	11,000
Ireland	11,000	9,000	19,992	21,700	22,000	22,000	22,000
Italy	180,000	235,000	211,000	190,500	190,000	190,000	190,000
Netherlands	20,200	22,200	17,000	17,000	16,000	16,000	16,000
Portugal	7,700	5,000	3,000	3,000	3,000	3,000	3,000
Spain	80,000	120,000	110,000	110,100	110,000	110,000	110,000
Sweden	91,200	77,859	78,900	65,200	68,000	65,000	65,000
Switzerland	6,400	10,100	8,000	9,000	9,000	9,000	9,000
United Kingdom	320,704	337,151	304,350	307,700	300,000	300,000	300,000
Total	1,480,000	1,610,000	1,330,000	1,270,000	1,300,000	1,300,000	1,300,000
Central Europe:							
Bosnia and Herzegovina	100	100	50	50	50	50	50
Bulgaria	72,150	84,100	93,500	84,300	80,000	80,000	80,000
Czech Republic	20,000	25,000	25,000	26,100	30,000	30,000	30,000
Estonia	--	--	7,000	9,000	10,000	10,000	10,000
Macedonia	22,500	22,900	--	--	15,000	15,000	15,000
Poland	66,421	55,900	62,455	67,298	70,000	70,000	70,000
Romania	26,000	28,000	37,900	33,100	30,000	30,000	30,000
Serbia[2]	23,600	1,242	700	700	1,000	1,000	1,000
Slovenia	7,237	15,300	15,400	15,400	15,000	15,000	15,000
Total	238,000	233,000	242,000	236,000	250,000	250,000	250,000
Central Eurasia:							
Kazakhstan	88,500	185,800	131,316	125,000	140,000	150,000	150,000
Russia	23,000	59,000	66,000	78,000	80,000	95,000	100,000
Ukraine	10,000	15,034	6,000	6,000	9,000	10,000	10,000
Total	122,000	260,000	203,000	209,000	230,000	260,000	260,000
Regional total	1,840,000	2,100,000	1,770,000	1,720,000	1,800,000	1,800,000	1,800,000

[e]Estimated. -- Zero.

[1]Projections, estimated data, and totals are rounded to no more than three significant digits; may not add to totals shown.

[2]Prior to 2005, data are for a combined Serbia and Montenegro.

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TABLE 14

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED NICKEL MINE PRODUCTION, 1995-2013[1]

(Ni content in metric tons)

Region and country	1995	2000	2005	2006	2009[e]	2011[e]	2013[e]
Europe:							
Western Europe:							
Finland	3,439	3,347	3,386	2,985	3,500	4,000	4,500
Greece	19,900	19,535	23,210	21,670	22,000	22,000	22,000
Norway	3,386	2,538	130	209	100	100	1,000
Spain	--	--	5,380	6,400	8,000	10,000	11,000
Total	26,700	25,400	32,100	31,300	34,000	36,000	39,000
Central Europe, Macedonia	3,500	--	--	--	--	--	--
Central Eurasia:							
Russia	251,000	315,000	315,000	320,000	330,000	330,000	340,000
Ukraine	1,400	--	2,000	12,000	12,000	12,000	12,000
Total	252,000	315,000	317,000	332,000	340,000	340,000	350,000
Regional total	283,000	340,000	349,000	363,000	380,000	380,000	390,000

[e]Estimated. -- Zero.

[1]Projections, estimated data, and totals are rounded to no more than three significant digits; may not add to totals shown.

TABLE 15

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PLATINUM MINE PRODUCTION, 1995-2013[1]

(Kilograms)

Region and country	1995	2000	2005	2006	2009[e]	2011[e]	2013[e]
Europe:							
Western Europe:							
Finland	37	441	678	1,000	1,000	1,000	1,000
Norway[2]	1,500	1,000	--	--	--	--	--
Total	1,540	1,440	678	1,000	1,000	1,000	1,000
Central Europe:							
Poland	21	21	20	20	20	20	20
Serbia[3]	6	3	1	1	1	1	1
Total	27	24	21	21	21	21	21
Central Eurasia, Russia	31,000	27,000	29,000	29,000	30,000	31,000	32,000
Regional total	32,600	28,500	29,700	30,000	31,000	32,000	33,000

[e]Estimated. -- Zero.

[1]Projections, estimated data, and totals are rounded to no more than three significant digits; may not add to totals shown.

[2]Data prior to 2005 represent exports.

[3]Prior to 2005, data are for a combined Serbia and Montenegro.

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TABLE 16

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PALLADIUM MINE PRODUCTION, 1995-2013[1]

(Kilograms)

Region and country[2]	1995	2000	2005	2006	2009[e]	2011[e]	2013[e]
Central Europe:							
Poland	12	12	10	10	10	10	10
Serbia[3]	46	21	8	8	8	8	8
Total	58	33	18	18	18	18	18
Central Eurasia, Russia	65,000	95,000	97,400	98,400	100,000	103,000	106,000
Regional total	65,100	95,000	97,400	98,400	100,000	100,000	110,000

[e]Estimated.

[1]Projections, estimated data, and totals are rounded to no more than three significant digits; may not add to totals shown.

[2]Palladium production for Finland and Norway has not been estimated.

[3]Prior to 2005, data are for a combined Serbia and Montenegro.

TABLE 17

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED ZINC MINE PRODUCTION, 1995-2013[1]

(Zn content in metric tons)

Region and country	1995	2000	2005	2006	2009[e]	2011[e]	2013[e]
Europe:							
Western Europe:							
Finland	16,385	30,493	72,474	66,109	65,000	65,000	65,000
Germany	--	--	--	--	--	50,000	50,000
Greece	15,100	20,300	1,300	16,414	22,000	23,000	23,000
Ireland	184,100	262,877	428,596	425,800	460,000	480,000	480,000
Italy	23,100	--	--	--	--	--	--
Norway	9,877	--	--	--	--	--	--
Portugal	--	--	--	7,505	100,000	120,000	135,000
Spain	172,468	200,021	--	--	--	--	--
Sweden	167,090	176,788	215,670	208,551	220,000	200,000	200,000
Total	588,000	690,000	718,000	724,000	870,000	940,000	950,000
Central Europe:							
Bosnia and Herzegovina	300	300	300	300	--	--	--
Bulgaria	26,000	9,400	17,500	13,500	14,000	15,000	15,000
Macedonia	8,300	25,000	--	21,700	25,000	30,000	30,000
Poland	154,500	156,900	117,200	126,000	150,000	140,000	130,000
Romania	34,730	27,452	13,784	9,574	9,000	9,000	9,000
Serbia[2]	3,195	3,266	900	2,100	2,500	2,500	3,000
Total	227,000	222,000	150,000	173,000	200,000	200,000	190,000
Central Eurasia:							
Armenia	700	528	3,196	2,270	2,500	3,000	3,000
Georgia	--	200	400	400	400	400	500
Kazakhstan	225,000	325,000	400,000	400,000	440,000	470,000	500,000
Russia	131,000	136,000	180,000	190,000	220,000	240,000	250,000
Total	357,000	462,000	584,000	593,000	660,000	710,000	750,000
Regional total	1,170,000	1,370,000	1,450,000	1,490,000	1,700,000	1,800,000	1,900,000

[e]Estimated. -- Zero.

[1]Projections, estimated data, and totals are rounded to no more than three significant digits; may not add to totals shown.

[2]Prior to 2005, data are for a combined Serbia and Montenegro.

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TABLE 18

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PRIMARY AND SECONDARY REFINED ZINC PRODUCTION, 1995-2013[1]

(Metric tons)

Region and country	1995	2000	2005	2006	2009[e]	2011[e]	2013[e]
Europe:							
Western Europe:							
Belgium	240,000	252,000	262,000	259,800	250,000	250,000	250,000
Finland	176,600	222,881	281,905	282,238	290,000	290,000	280,000
France	314,000	347,705	210,000	120,000	150,000	150,000	150,000
Germany	322,460	356,516	334,891	342,556	330,000	320,000	320,000
Italy	259,600	170,300	121,200	109,200	110,000	110,000	110,000
Netherlands	208,000	216,800	213,800	235,913	230,000	230,000	230,000
Norway	121,576	125,800	151,285	160,700	160,000	160,000	160,000
Spain	364,000	387,100	501,400	502,800	500,000	500,000	500,000
United Kingdom	105,998	99,600	--	--	--	--	--
Total	2,110,000	2,180,000	2,080,000	2,010,000	2,000,000	2,000,000	2,000,000
Central Europe:							
Bulgaria	79,700	84,200	92,500	85,900	100,000	100,000	110,000
Czech Republic	1,000	150	250	250	250	250	250
Macedonia	21,335	62,800	--	--	10,000	10,000	10,000
Poland	166,421	173,000	137,300	134,000	140,000	140,000	140,000
Romania	28,331	51,900	56,795	43,705	50,000	50,000	50,000
Serbia[2]	5,976	8,291	6,000	4,000	15,000	15,000	15,000
Total	303,000	380,000	293,000	268,000	320,000	320,000	330,000
Central Eurasia:							
Kazakhstan	239,000	262,200	356,907	349,000	370,000	380,000	400,000
Russia	166,000	230,000	220,000	240,000	260,000	350,000	400,000
Uzbekistan	70,000	18,000	35,030	35,000	40,000	50,000	60,000
Total	475,000	510,000	612,000	624,000	670,000	780,000	860,000
Regional total	2,890,000	3,070,000	2,980,000	2,910,000	3,000,000	3,100,000	3,200,000

[e]Estimated. -- Zero.

[1]Projections, estimated data, and totals are rounded to no more than three significant digits; may not add to totals shown.

[2]Prior to 2005, data are for a combined Serbia and Montenegro.

TABLE 19

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED NATURAL DIAMOND PRODUCTION, 1995-2013[1, 2]

(Thousand carats)

Region and country	1995	2000	2005	2006	2009[e]	2011[e]	2013[e]
Central Eurasia, Russia:							
Gem grade	17,000	17,500	23,000	23,250	24,000	25,000	25,000
Industrial grade	11,000	11,700	15,000	15,100	16,000	17,000	17,000
Regional total	28,000	29,200	38,000	38,400	40,000	42,000	42,000

[e]Estimated.

[1]Projections, estimated data, and totals are rounded to no more than three significant digits; may not add to totals shown.

[2]The large increase in Russian diamond production reflects mainly newly released Russian diamond production data. Future volumes will reflect revised historic Russian diamond production data.

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TABLE 20

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PHOSPHATE ROCK PRODUCTION, 1995-2013[1]

(P_2O_5 content in thousand metric tons)

Region and country	1995	2000	2005	2006	2009[e]	2011[e]	2013[e]
Europe:							
Western Europe, Finland	244	277	301	300	300	300	300
Central Eurasia:							
Kazakhstan	2	10	55	55	120	150	150
Russia	3,400	4,450	4,220	4,220	4,400	4,400	4,500
Uzbekistan	--	36	102	140	150	170	180
Total	3,400	4,500	4,380	4,420	4,700	4,700	4,800
Regional total	3,650	4,770	4,680	4,720	5,000	5,000	5,100

[e]Estimated. -- Zero.

[1]Projections, estimated data, and totals are rounded to no more than three significant digits; may not add to totals shown.

TABLE 21

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED SALABLE COAL PRODUCTION, 1995-2013[1,2]

(Thousand metric tons)

Region and country	1995	2000	2005	2006	2009[e]	2011[e]	2013[e]
Europe:							
Western Europe:							
Austria	1,282	1,255	6	5	--	--	--
France	8,416	4,102	--	--	--	--	--
Germany	246,322	201,975	202,815	197,206	190,000	180,000	170,000
Greece	56,533	64,026	73,585	74,000	75,000	75,000	75,000
Italy	352	19	--	--	400	600	600
Norway	343	330	300	300	220	200	200
Spain	28,476	23,470	19,354	18,399	15,000	20,000	20,000
United Kingdom	53,600	31,972	20,498	20,000	20,000	20,000	20,000
Total	395,000	327,000	317,000	310,000	300,000	300,000	290,000
Central Europe:							
Albania	81	21	13	13	13	15	20
Bosnia and Herzegovina	1,808	7,441	9,000	9,965	10,000	10,000	10,000
Bulgaria	30,830	27,094	24,909	25,359	27,000	27,000	27,000
Croatia	75	--	--	--	--	--	--
Czech Republic	80,082	68,091	61,903	62,391	65,000	65,000	65,000
Hungary	14,453	14,276	9,580	9,898	12,000	14,000	14,000
Macedonia	7,991	7,516	6,880	6,650	8,000	8,000	8,000
Montenegro	NA	NA	1,288	1,502	2,000	2,000	2,000
Poland	200,713	162,815	159,039	156,064	170,000	170,000	170,000
Romania	41,128	29,294	31,122	30,100	35,000	35,000	35,000
Serbia[3]	40,556	32,275	34,565	36,785	38,000	40,000	40,000
Slovakia	4,140	3,589	2,511	2,500	3,000	3,500	3,500
Slovenia	4,884	4,480	4,539	4,521	4,500	4,500	4,500
Total	427,000	357,000	345,000	346,000	370,000	380,000	380,000
Central Eurasia:							
Georgia	40	7	5	8	10	10	10
Kazakhstan	113,000	74,872	86,385	96,321	105,000	115,000	120,000
Kyrgyzstan	463	425	340	314	350	350	350
Russia	263,000	273,578	298,300	308,800	330,000	350,000	370,000
Tajikistan	100	21	99	102	105	105	110
Ukraine	83,800	81,907	74,559	75,824	90,000	100,000	110,000
Uzbekistan	3,200	2,556	3,000	3,121	3,500	4,000	4,500
Total	464,000	433,000	463,000	484,000	530,000	570,000	600,000
Regional total	1,290,000	1,120,000	1,120,000	1,140,000	1,200,000	1,200,000	1,300,000

[e]Estimated. NA Not available. -- Zero.

[1]Projections, estimated data, and totals are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes anthracite, bituminous, and run-of-mine lignite.

[3]Prior to 2005, data are for a combined Serbia and Montenegro.

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TABLE 22

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED URANIUM PRODUCTION, 1995-2013[1]

(U_3O_8 content in metric tons)

Region and country	1995	2000	2005	2006	2009[e]	2011[e]	2013[e]
Europe:							
Western Europe:							
France	840	375	--	--	--	--	--
Germany	41	33	111	77	60	50	40
Portugal	22	16	--	--	--	--	--
Spain	420	347	--	--	--	--	--
Total	1,320	771	111	77	60	50	40
Central Europe:							
Bulgaria	700	700	700	700	700	700	700
Czech Republic	721	587	482	422	450	450	450
Hungary	277	--	--	--	--	--	--
Total	1,700	1,290	1,180	1,120	1,200	1,200	1,200
Central Eurasia:							
Kazakhstan	1,920	2,052	5,138	6,226	10,000	13,000	15,000
Russia	2,650	2,948	4,045	3,762	4,000	4,300	4,600
Ukraine	590	708	943	943	1,200	1,500	1,600
Uzbekistan	2,100	2,771	2,712	2,665	2,800	3,000	3,200
Total	7,260	8,480	12,800	13,600	18,000	22,000	24,000
Regional total	10,300	10,500	14,100	14,800	19,000	23,000	26,000

[e]Estimated. -- Zero.

[1]Projections, estimated data, and totals are rounded to no more than three significant digits; may not add to totals shown.

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The Mineral Industry of Austria

By Harold R. Newman

Although the mining industry has had a long tradition in Austria, activity in the metal mining sector has declined during the past few years owing principally to environmental issues, high mining costs, low ore grades and reserves, and increased foreign competition. All metal mines except the open pit iron ore operation at Erzberg and the underground tungsten operation at Mittersill were closed in 2006. A variety of industrial minerals were produced.

Production

Commodities for which Austria produced more than 1% of world production in 2006 were as follows: industrial sand and gravel, 6%; magnesite, 5%; and tungsten, 2%. Most growth in the mineral resources area was in the industrial minerals sector. Data on Austria's mineral production are provided in table 1.

Structure of the Mineral Industry

Most of the Austrian mineral industry was privately owned; a portion of the industry, however, was still under Government control. Österreichische Industrieholding AG (ÖIAG) was the investment and privatization agency of the Government. In line with its Government mandate, ÖIAG employs a double strategy—it both stimulates increases in the value of investments for which it is responsible and examines exit scenarios for the partial or complete privatization of those companies for which privatization is envisaged. Table 2 is a list of major mineral industry facilities.

Commodity Review

Metals

Copper.—Montanwerke Brixlegg AG was the only copper producer in Austria. It specialized in the recycling of copper and other valuable materials to extract pure metals, oxides, and salts from such materials as alloys, scrap metals, and residues through the refining process (A-Tech Industries AG, 2006).

Iron and Steel.—The State of Styria had the largest deposits of mineral resources in Austria. Voest-Alpine Erzberg GmbH produced about 2 million metric tons per year (Mt/yr) of iron ore with a content of 32% iron and 2% manganese by open pit mining from the Erzberg Mine, which was the largest iron ore open pit mine in central Europe. The main ore minerals were ankerite, ferrous dolomite, and siderite.

Treibacher Industrie AG had been producing ferroalloys for more than 80 years and was a market leader for such ferroalloys as ferromolybdenum and ferrovanadium. At the facility in Althofen, Treibacher processed spent catalysts and residues from the petrochemicals industry that contained molybdenum, nickel, and vanadium (Treibacher Industrie AG, 2006).

Voest-Alpine Stahl AG was an international producer and distributor of steel and steel products. The company's activities were carried out through four divisions: automotive, crude steel, profilform, and railway systems.

Tungsten.—Wolfram Bergbau und Hütten GmbH (WBH) operated one of the Western world's leading tungsten mines at Mittersill and a tungsten conversion plant at Bergla. The production line started at the mine in Mittersill where scheelite (calcium tungstate) was extracted in an underground mining operation. The crude ore was transported to the ore-dressing plant in Bergla. At the ore-dressing plant, the crude ore was converted into a scheelite concentrate using a flotation process (Wolfram Bergbau und Hütten GmbH, 2006).

Industrial Minerals

Cement.—In Austria, cement demand in 2006 was met mostly by domestic production; about 10% of the demand of the building industry was met through imports (Global Cement, 2007).

Lafarge Perlmooser AG, which was a part of the Lafarge Group, was Austria's leading manufacturer of cement. Lafarge Pelrmooser had cement plants in Mannesdorf and Retsnei and a grinding plant located in Kirchbichl. The operations produced about 1.5 Mt/yr of cement. A 100% owned subsidiary (Lafarge Beton) was active throughout Austria in the area of transportation of concrete products (Lafarge Perlmooser AG, 2006).

Mineral Fuels

OMV Aktiengesellschaft (OMV) was Austria's leading industrial company in the area of mineral fuels. It explored for natural gas and petroleum and imported, transported, and stored natural gas.

OMV Austria Exploration & Production (a wholly owned subsidiary of OMV) was expanding its drilling for natural gas in the State of Lower Austria where it had about 50 active production areas. OMV, together with KCA Deutag, started using a new drilling station at Ebenthal Tief 2 (Platts, 2006).

More-extensive coverage of the mineral industry of Austria can be found in the 2005 Minerals Yearbook, volume III, Area Reports—International—Europe and Central Eurasia, which is available online at http://minerals.usgs.gov/minerals/pubs/country.

References Cited

A-Tech Industries AG, 2006, Business areas: A-Tech Industries AG, p. 2. (Accessed July 10, 2007, at http://www.a-techindustries.com/pdf/gb/A_TEC_English.pdf.)

Global Cement, 2007, Global cement directory—Austria: Global Cement, p. 4. (Accessed July 10, 2007, at http://www.propubs.com/global-cement/GCDlow-res.pdf.)

Lafarge Perlmooser AG, 2006, Company profile: Lafarge Perlmooser AG. (Accessed July 11, 2007, at http://www.leitbetriebe.at/bau/lafarge/lafarge_engl.htm.)

Digitized by Google

Platts, 2006 (May 29), Austria's OMV expands drilling for gas in Lower Austria: Platts, p. 1. (Accessed May 30, 2006, at http://www.platts.com/Natural Gas/News/8459508.xml.)
Treibacher Industrie AG, 2006, Ferroalloys: Treibacher Industrie AG. (Accessed July 10, 2007, at http://www.treibacher.com/863.html.)
Wolfram Bergbau und Hütten GmbH, 2006, Wolfram mining + refining: Wolfram Bergbau und Hütten GmbH. (Accessed August 8, 2007, at http://www.wolfram.at/wolfram_at/wEnglisch/unternehmen/index3223655460navidW2618000000000.html.)

TABLE 1
AUSTRIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Thousand metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006[e]
METALS						
Aluminum, metal, secondary	metric tons	151,100	155,000 [e]	160,000 [e]	151,200	150,000
Copper, refined, secondary	do.	64,932	65,084	74,245	72,316	72,600 [2]
Gold, metal[e]	kilograms	50	25	15	15	15
Iron and steel:						
Iron ore and concentrate:						
Gross weight		1,936	2,119	1,882	2,048	2,000
Fe content		621	678	602	655 [e]	650
Metal:						
Pig iron		4,669	4,677	4,847	5,444	5,400
Ferroalloys, electric arc furnace[e]		5	5	6	6	6
Crude steel		6,208	6,261	6,530 [e]	7,031	7,129 [2]
Semimanufactures[e]		5,300 [2]	5,300	5,400	5,500	5,500
Lead, refined, secondary[e]	metric tons	21,000	18,000	24,000 [r]	22,000 [2]	22,000
Manganese, Mn content of domestic iron ore[e]	do.	16,000	16,000	16,000	16,000	16,000
Tungsten, mine output, W content of concentrate	do.	1,384	1,332	1,400 [e]	1,280 [r]	1,300
INDUSTRIAL MINERALS						
Cement, hydraulic		3,918 [r]	3,886	3,976	4,736	4,700
Clays:						
Illite		60	1,708	2,013	2,000 [e]	2,000
Kaolin, crude		51 [r]	100	105 [r]	56	60
Other[e]		2,600	2,600	2,600	2,500	2,500
Gypsum and anhydrite, crude		962	1,004	1,039	1,113	1,000
Lime[e]		2,000	2,000	2,000	1,000 [r]	1,000
Magnesite:						
Crude		728	767	715	694	700
Sintered or dead-burned		200	200 [e]	267	304	300
Caustic calcined[e]		60	165	161	98	100
Nitrogen, N content of ammonia[e]		400	400	440	400	400
Pigments, mineral, micaceous iron oxide[e]	metric tons	5,000	5,000	5,000	5,000	5,000
Pumice (trass)	do.	3,000 [e]	2,865	2,900	2,943	3,000
Salt (rock and brine), NaCl content	do.	496,882 [r]	1,028,273 [r]	1,030,234 [r]	1,024,040 [r]	1,030,000
Sand and gravel:						
Quartz sand		835	944	864 [r]	1,704	1,700
Other sand and gravel		5,261	6,079	5,886 [r]	6,000	6,000
Total		6,096	7,023	6,750 [r]	7,704	7,700
Sodium compounds, n.e.s., manufactured:[e]						
Soda ash		150	150	150	100	100
Sulfate		100	100	100	100	100
Stone:[3]						
Dolomite		5,836	5,468	5,907	6,291	6,200
Quartz and quartzite		362	283	294	249	250
Other:						
Limestone and marble		24,884	24,477	24,158	25,576	25,000
Basalt		4,533	4,669	5,197	3,166	3,200
Marl		1,534	1,069	1,747	1,479	1,500
Crushed stone[e]		12,000	12,000	5,858 [2]	4,917 [2]	5,000
Total		42,951	42,215	36,960	35,138	35,000
Grand total		49,149	47,966	43,161	41,678	41,200

See footnotes at end of table.

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TABLE 1—Continued
AUSTRIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Thousand metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006[e]
INDUSTRIAL MINERALS—Continued						
Sulfur, byproduct of petroleum and natural gas	metric tons	9,444	10,400	10,705 [r]	8,458	9,000
Talc and soapstone, crude	do.	138,195	137,596	136,305 [r]	166,569 [r]	136,000
MINERAL FUELS AND RELATED MATERIALS						
Coal, brown and lignite		1,413	1,152	235	6	5
Coke		1,394	1,400 [e]	1,414	1,400 [e]	1,400
Natural gas:						
Gross	million cubic meters	2,015	2,030	2,011	1,654	1,700
Marketed[e]	do.	1,200	1,200	1,200	1,200	1,200
Oil shale	metric tons	336	432	248 [r]	-- [r]	--
Petroleum:						
Crude	thousand 42-gallon barrels	7,176	6,976	6,728	6,413	6,500
Refinery products:						
Liquefied petroleum gas	do.	159	580	661	1,241	1,250
Gasoline	do.	17,017	15,394	14,773	15,283	15,250
Kerosene and jet fuel	do.	3,888	3,576	3,534	4,596	4,500
Distillate fuel oil	do.	27,457	26,987	27,000	27,000	27,000
Residual fuel oil	do.	6,732	7,009	6,061	6,141	6,200
Unspecified	do.	30,387	29,169	33,075	31,654	30,000
Refinery fuel and losses	do.	4,550	4,739	5,068	4,627	4,600
Total	do.	90,190	87,454	91,809	90,542	88,800

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised.
[1]Table includes data available through April 2007.
[2]Reported figure.
[3]Excludes stone used by the cement and iron and steel industries.

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TABLE 2
AUSTRIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Alumina, fused	Treibacher Schleifmittel AG	Plant at Villach	100.
Aluminum	Aluminum Lend GmbH (Salzburger Aluminium AG, 100%)	Secondary ingot plant at Lend	25.
Do.	AMAG Casting GmbH (Amag Austria Metall, 100%)	Secondary ingot plant at Ranshofen	50.
Cement	Lafarge Perlmooser AG (Lafarge Group, 100%)	Plants at Mannesdorf and Retsnei; grinding plant at Kirchbichl	2,200.
Do.	Wietersdorfer & Peggauer Zementwerke GmbH	Plants at Peggau and Wietersdorf	1,000.
Do.	Zementwerk Leube GmbH	Plant at Gartenau	700.
Do.	SPZ Zementwerke Eiberg GmbH	Plant at Eiberg	600.
Do.	Gmundner Zement	Plant at Gmundner	580.
Coal	Graz-Koflacher Eisenbahn und Bergbaugesellschaft GmbH (Government, 100%)	Oberdorf Mine, Barnbach (closed)	1,200.
Copper, secondary	Montanwerke Brixlegg AG (A-Tec Industries, 91.6%)	Plant at Brixlegg	75 cathode, 66 billet.
Ferroalloys, FeV, FeMo, FeNi	Treibacher Industries AG	Plants at Althofen and Treibach	10.
Graphite	Industrie und Bergbaugesellschaft Pryssok & Co KG	Trandorf Mine at Mühldorf	15.
Do.	Grafitbergbau Kaiserberg AG	Kaisersberg Mine	3.
Do.	do.	Trieben Mine	3.
Gypsum	Erste Salzburger Gipswerk-Gesellschaft Christian Moldan KG	Abtenau and Moosegg Mines	300.
Do.	Rigips Austria GmbH	Grundlsee, Puchberg, Unterkainisch, and Weisenbach Mines	250.
Do.	Knauf Gesellschaft GmbH	Hinterstein Mine	160.
Iron ore	Voest-Alpine Erzberg GmbH	Erzberg Mine at Eisenerz	3,000.
Lead	Bleiberg Bergwerks-Union AG (Metall Gesellschaft, 74%)	Smelter at Brixlegg	55.
Magnesite	Veitsch-Radex GmbH (RHI AG, 100%)	Mines at Breitenau, Hochfilzen, Radenthein, Trieben, and Veitsch	800.
Natural gas million cubic meters	Osterreichische Aktiengesellschaft (Government, 100%)	Fields in Vienna Basin	1,500.
Nitrogen, N content of ammonia	Agrolinz AG	Plant at Linz	498.
Salt	Österreichische Salinen GmbH (Invest Holding GmbH, 100%)	Mines at Bad Ischl	800.
Steel, crude	Voest-Alpine Stahl GmbH	Plants at Donawitz and Linz	8,500.
Talc	Luzenac Naintsch AG	Mines at Lassing, Rabenwald, and Weisskirchen; plants at Oberfeistitz and Weisskirchen	160.
Tungsten, W content	Wolfram Bergbau und Hütten GmbH Nfg KG	Mittersill Mine, Felbertal, Salzburg; conversion plant, Bergla	350.

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The Mineral Industries of the Northern Balkans

Bulgaria and Romania

By Walter G. Steblez[1]

Bulgaria and Romania form the northeastern part of the Balkan Peninsula, which borders the Black Sea to the east, Ukraine and Moldova to the north, Greece and Turkey to the south and southeast, Macedonia, Serbia, and Montenegro to the west, and Hungary to the northwest. The Danube River forms a natural boundary between Bulgaria in the south and Romania in the north. Bulgaria is encompassed within the Mediterranean Alpine folded zone, which comprises the Carpatho-Balkan branch to the north and the Dinaric-Hellenic branch to the south (Bogdanov, 1982, p. 215). The Carpatho-Balkan branch also constitutes the primary folded zone in Romania, which incorporates the eastern and southern Carpathian Mountains, and the Apuseni Mountains within the Carpathian Arc to the west of the Transylvanian Plateau (Ianovici and Borcos, 1982, p. 55-57).

Mining and metalworking in this region has a long history that was well-documented by Roman times when Bulgaria and Romania, which were known as Thrace and Dacia, respectively, were important sources of base and precious metals. Gold and nonferrous metals mined in this region have remained attractive investment opportunities to foreign investors.

BULGARIA

Bulgaria's mineral industry included the mine output of ferrous and nonferrous metals, mineral fuels (mainly coal), and such industrial minerals as clays, gypsum, and rock salt. Additionally, the metallurgical sector smelted and refined copper, gold, iron and steel, lead, silver, and zinc. Cement, dimension stone, and other construction materials also were produced. On a world scale, however, Bulgaria's mineral industry was small and mainly of regional importance. Many of the country's mineral requirements were met through domestic production. Bulgaria, however, remained dependent on imports of copper ores, iron ore, lead and zinc ores, steel, and mineral fuels.

Minerals in the National Economy

In 2006, Bulgaria's gross domestic product (GDP) grew by about 6.1% compared with that of 2005. Industrial production, which accounted for about 26% of the GDP, grew by about 6%. In 2006, the overall output value of the mining sector increased by 1.8% compared with that of 2005. The mining industry's branches reported a 2.9% growth in the output value of coal and peat mining, a 2.7% decrease in the output value of metal ores, and an 11% increase in the output value of industrial mineral mining and quarrying (National Statistical Institute, 2007). Exploration for gold at Krumovgrad in the Kurdjali area and several other locations was among the leading activities in the mineral industry of Bulgaria in 2006.

[1]Deceased.

Government Policies and Programs

The Law on Transformation and Privatization of State and Municipal-Owned Enterprises was adopted by Parliament in 1992, and the Underground Resources Act was adopted in 1998; these laws were adopted to promote private enterprise and foreign investment. The principle of equal treatment of foreign and domestic investors was promulgated in law in the Constitution and in the Law on Encouragement of Investments (Krastanova, 2005).

Despite explicitly stipulating state ownership of underground minerals, the Underground Resources Act provides for the submission and approval procedures for permits and claims by domestic and foreign companies to develop and operate mineral deposits for up to 35 years with additional 15-year extensions. Exploration rights to private companies could be granted for up to 3 years (Kousseff, 1999). In addition, the National Program for Sustainable Development of Mining in Bulgaria was drafted and approved in 1998. The Government continued to work to improve the country's environmental condition and began enforcement of environmental regulations that would meet the European Union's (EU) standards at all new mineral industry projects. In 2006, Bulgaria's Chamber of Mining and Geology (BCMG) indicated that the country's mining and mineral processing sector would need about 1.2 billion euros (€) ($1.6 billion)[2] to meet the EU's ecological standards. To meet this objective, BCMG requested funds from the EU to restore areas environmentally polluted by the mineral sector (Sofia Echo, The, 2006e).

Production

In 2006, production of metals showed divergent trends. Among the base metals, production of copper concentrate and refined metal increased by 7% and 8%, respectively. Production of lead concentrate and refined metal decreased by 18% and 10%, respectively, and production of zinc concentrate and refined metal declined by 23% and 7%, respectively. Production of pig iron and steel were at about the same level as in 2005; however, the production of manganese declined to almost one-half that in 2005. Production of bentonite and kaolin increased by almost 20% each. The production of silica (quartz sand) fell to only 43% of 2005 production. Among construction materials, cement production decreased by 5%; however, sand and gravel production increased by 18%. Production of mineral fuels was at about the same level as in 2005.

[2]Where necessary, values have been converted from European euros (€) to U.S. dollars ($) at an average rate of €0.758= $1.00.

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Structure of the Mineral Industry

Table 2 presents information about the significant mineral processing sites in Bulgaria.

Commodity Review

Metals

Bulgaria's mine output included copper, iron, lead and zinc, and manganese. Additionally, byproduct gold, silver, molybdenum, and other metals have been produced, chiefly from the processing of copper and lead and zinc ores and concentrates. Bulgaria's production of primary aluminum metal (ingot) was based entirely on aluminum scrap.

Aluminum.—Bulgaria produced a small amount of secondary metal. Most aluminum required by the country's semimanufactures-producing sector came from imports. In 2006, Bulgaria's consumption of refined aluminum amounted to more than 25,000 metric tons (t), which was an increase of about 1.2% compared with that of 2005. In 2006, Alcomet AD, which was Bulgaria's producer of aluminum semimanufactures, reported several investment projects that were in progress. These included the modernization of the casting and extrusion shops (three new furnaces and five continuous casting lines), and the modernization of a 2,000-t extrusion press. The total value of investments in 2006 amounted to €5.3 million ($7 million), which was an increase of about 47% compared with that of 2005. Alcomet's total rolling capacity in 2006 amounted to slightly more than 40,000 metric tons per year (t/yr) (Alcomet plc, 2007). Other developments involved Alcoa Inc.'s operational startup of an aluminum foil plant in Stara Zagora, which was given an investment value of about $30 million (Reuters, 2006; Sofia Echo, The, 2006a).

Copper.—Bulgaria's major copper deposits were developed and exploited in the Srednogorie-Panagjurishte region of the country. Three major mines were in operation—the Asarel-Medet JSC and the Elatsite AD surface mines, and the Chelopech underground mine. Asarel-Medet and Elatsite, which were the principal producers of copper ore in Bulgaria, had a combined production capacity of 350,000 t/yr of copper concentrate. Asarel-Medet Mine holds more than 510 million metric tons (Mt) of ore that hosts about 2.3 Mt of copper, and Elatsite Mine holds 320 Mt of ore that hosts 1.1 Mt of copper (Euromax Resources Ltd., 2004).

The Cumerio Med (Cumerio) copper smelting and refining complex at the Pirdop complex was the principal producer of copper in Bulgaria. In 2006, Cumerio began the construction of a new copper refinery that was to have a design capacity of about 180,000 t/yr, which would triple the complex's existing refining capacity. The cost of the new refinery was estimated to be €70 million ($92 million). Cumerio planned to start the modernization of the Pirdop smelter in 2007, which would increase the smelter's output by about 15%; the cost of the project was estimated to be about €12 million ($16 million) (Cumerio Med, 2007a, p. 5; 2007b, p. 5).

The Chelopech mining operation, which is located about 70 kilometers (km) east of Sofia, worked a polymetallic deposit that contained mainly copper and associated precious metals (gold and silver). Chelopech Mine was considered to be primarily a gold producer owing to the much higher value of gold produced. The copper content of the ore averaged about 1.5%. Measured and indicated resources were reported to be about 23.9 Mt of ore at a grade of 4 grams per metric ton (g/t) gold, 10 g/t silver, and 1.5% copper (about 374,000 t). Dundee Precious Metals Inc. (Dundee) of Canada, which acquired mining and exploration rights at Chelopech in 2003, continued an active exploration program for copper and gold at Chelopech and several other areas (Dundee Precious Metals Inc., 2004a, b).

Dundee's copper production at Chelopech amounted to 11,168 t in 2006. Facility expansion at the mine to raise ore output to 2 million metric tons per year (Mt/yr) was 62% completed by yearend (Dundee Precious Metals Inc., 2007b).

Gold.—In 2006, gold production amounted to about 3.8 t, which was about a 1.3% decrease compared with that of 2005. Dundee continued exploration for gold in the Krumovgrad region near Kurdjali. The prospecting concession covered 117 square kilometers (km^2) and encompassed (in an east-west arc) the Sumak, the Skalak, the Kuklitsa, the Ada Tepe, and the Kupel deposits. Work at Krumovgrad in 2006 was put in abeyance pending the resolution of environmental issues (Dundee Precious Metals Inc., 2006; 2007a, p. 7).

Cambridge Mineral Resources plc of the United Kingdom continued to explore for gold at sites that define an arc along the southeastern border with Greece and Turkey in Bulgaria, which include the Dobroselets, the Gornoseltsi, the Polski Gradets, and the Rozino exploration licenses and permit areas. In 2006, Cambridge also conducted exploration for gold at Tashlaka Hill in southeastern Bulgaria. Drill results showed gold ranging from 3.2 to 29.3 g/t (Cambridge Mineral Resources plc, 2007, p. 12).

In 2006, Euromax Resource Ltd. of Canada continued to explore for gold and silver in the Rhodope Mountains. Exploration was conducted under the Popintsi, the Rakitovo, and the Trun licenses. Analysis of trenching at Popintsi showed gold values ranging from 0.8 to 4 g/t. High-grade gold mineralization was revealed at Trun where gold values ranged from 22.2 to 106 g/t (Euromax Resources Ltd., 2006a, b).

Iron and Steel.—The estimated production of pig iron and crude steel, which was based on imported raw materials, varied only slightly from the output level of 2005 (table 1). Sidenor S.A. of Greece, which was the majority stock share owner of Stomana AD (80%), continued to implement the facility expansion at Stomana, which would include a rolling mill for light long-carbon-steel products and such new equipment as automation and control equipment; a billet welder; bundling, finishing, and stacking facilities; and a preheating furnace. The aim of the upgrading program was to raise the plant's long-product's rolling capacity to 600,000 t/yr. In 2006, the International Finance Corporation (IFC), which was affiliated with the World Bank, invested $21.4 million as part of a financial package to assist in completing the $73 million program; this amount was in addition to an earlier IFC outlay of about $22 million (International Finance Corporation, 2006; Stomana S.A., 2006).

In 2006, Global Steel Holdings Ltd. (GSHL) of India, which held 71% equity in the Kremikovtsi Corp., announced plans

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to invest $71 million towards the reduction of pollution by the plant by 2011 (Sofia Echo, The, 2006d).

Lead and Zinc.—The lead and zinc industry in Bulgaria was based on mining and processing operations near Plovdiv in the Ossogovo Mountains of western Bulgaria, near the Thundza River in southeastern Bulgaria, and in the Madan area near the Greek border. Lead and zinc smelting and refining operations were based in Kurdjali in the Madan area and in Plovdiv. The underground lead and zinc mining complex at Gorubso continued to be the country's major producer of lead and zinc ore (table 2).

In 2006, total mine production of lead in concentrate declined by almost 18% compared with that of 2005. The production of zinc in concentrate declined by almost 23% compared with that of 2005 (table 1). Primary and secondary lead production amounted to about 84,300 t, which was almost a 10% decrease compared with that of 2005. Lead & Zinc Complex PLC Kurdzhali (OTZK) anticipated significant production increases as a result of equipment modernization and the acquisition of several mines in the Kurdzhali area. OTZK indicated that lead production would increase by 122% to 30,000 t, and that zinc output would increase by about 6% to 27,500 t (Metals Insider, 2006, p. 17).

Manganese.—The Obroschishte manganese mine remained Bulgaria's sole producer of mainly carbonate-type (rhodocrosite) manganese ore, which was hosted in Oligocene-age volcanic sedimentary rocks (aleurolite, clay, glauconitic sandstone, marl, and tuff). Apart from the mining operations that were engaged at the Obroschishte deposit, OreVest plc of the United Kingdom undertook exploration of a 10.4-km^2 section of the deposit, which is located about 3 km southeast of the Obroschishte Mine, with the aim of developing a new mine (OreVest plc, 2006).

Industrial Minerals

Bulgaria produced a broad range of industrial minerals suitable for chemical and construction industry uses. These included barite, calcareous rock, cement, clays, lime, salt, and silica. Bentonit AD and Kaolin AD were the major producers of industrial minerals in Bulgaria. Kaolin AD operated quarries and processing facilities at Kaolinovo and Vetovo (kaolin), Shoumen and Varna (quartz-feldspathic sands), and Konarata and Ustrem (potassium and sodium feldspars). Final output included kaolin, glass sand, and dry and wet silica sands.

Bentonit AD was a major Bulgarian producer of bentonite, perlite, and zeolite. With bentonite, zeolite, and perlite resources amounting to about 7.3 Mt, 2.8 Mt, and 0.8 Mt, respectively, Bentonit AD's corresponding processing capacities were reported to be 200,000 t/yr, 50,000 t/yr, and 150,000 cubic meters per year.

Mineral Fuels and Other Sources of Energy

In 2006, Bulgaria reported a 1.8% increase in total coal output compared with that of 2005. Coal mining, which supplied about 45% of the fuel needed to generate electric power, was the predominant fossil fuel-producing sector in Bulgaria. The country's production of natural gas declined by about 3% compared with that of 2005 (table 1). Petroleum production, which was small, ranged between 25,000 and 33,000 t in the 2002 to 2006 period. During the year, discussions continued among various international participants concerning the construction of several oil pipeline projects that would alleviate daily oil tanker congestion in the Bosporus and increase deliveries of oil and gas to the EU (Alexander's Gas & Oil Connections, 2006b; Sofia Echo, The, 2006c).

At yearend 2006, Bulgaria's nuclear power sector reported the start of construction of the country's second (after the Kozloduy powerplant) nuclear-powered electric powerplant at Belene. The plant's construction was projected to take 6 ½ years; French, German, and Russian companies would combine efforts to build two 1,000-megawatt reactors (Alexander's Gas & Oil Connections, 2006a; Sofia Echo, The, 2006b).

Outlook

Bulgaria's application to join the EU carries a broad range of requirements, which include modernization of industrial plant and infrastructure. To meet these requirements, Bulgaria is expected to continue to develop its industrial minerals sector, especially quarries and processing facilities for the production of construction materials. Exploration for precious metals also is expected to increase.

References Cited

Alcomet plc, 2007, Investments: Shumen, Bulgaria, Alcomet plc. (Accessed August 25, 2006, via http://www.alcomet-plc.com/index_en.htm.)

Alexander's Gas & Oil Connections, 2006a, Atomstroiexport wins $5 bn nuclear plant contract in Bulgaria: Alexander's Gas & Oil Connections press release, v. 11, no. 24, December 21, 1 p.

Alexander's Gas & Oil Connections, 2006b, Greece and Bulgaria pledge to proceed with pipeline project: Alexander's Gas & Oil Connections, v. 11, no. 10, May 18, 1 p.

Bogdanov, B., 1982, Bulgaria, *in* Mineral deposits of Europe—Southeast Europe: London, United Kingdom, The Institute of Mining and Metallurgy and the Mineralogical Society, p. 215.

Cambridge Mineral Resources plc, 2007, Annual reports and accounts: London, United Kingdom, Cambridge Mineral Resources plc, June 14, 38 p.

Cumerio Med, 2007a, Annual report 2006: Brussels, Belgium, Cumerio Med, 92 p.

Cumerio Med, 2007b, Half year report 2007: Brussels, Belgium, Cumerio Med, August 21, 29 p.

Dundee Precious Metals Inc., 2004a, Dundee Precious Metals Inc.—Progress report on Bulgarian activities: Toronto, Ontario, Canada, Dundee Precious Metals Inc. press release, September 17, 3 p.

Dundee Precious Metals Inc., 2004b, Dundee Precious settles remaining obligations on purchase of Bulgarian mining assets from Navan: Toronto, Ontario, Canada, Dundee Precious Metals Inc. press release, January 10, 2 p.

Dundee Precious Metals Inc., 2006, Bulgarian government calls additional environmental council meeting on Chelopech expansion project: Toronto, Ontario, Canada, Dundee Precious Metals Inc. press release, March 16, 2 p.

Dundee Precious Metals Inc., 2007a, Annual report 2006: Toronto, Ontario, Canada, Dundee Precious Metals Inc., March 23, 68 p.

Dundee Precious Metals Inc., 2007b, Operations—Bulgaria—Chelopech Gold/Copper Mine: Toronto, Ontario, Canada, Dundee Precious Metals Inc. brochure, 2 p.

Euromax Resources Ltd., 2004, Euromax acquires Popintsi property: Vancouver, British Columbia, Canada, Euromax Resources Ltd. press release, August 27, 5 p.

Euromax Resources Ltd., 2006a, New high grade Nadedja gold zone discovered at Trun: Vancouver, British Columbia, Canada, Euromax Resources Ltd. press release, August 22.

Digitized by Google

Euromax Resources Ltd., 2006b,Trenching results Popintsi gold project: Vancouver, British Columbia, Canada, Euromax Resources Ltd. press release, August 17, 1 p.
International Finance Corporation, 2006, Bulgaria—Proposed investment in Stomana II: Washington, DC, International Finance Corporation report no. IFC/R2006/0170, June 20.
Kousseff, Vladimir, 1999, Bulgaria: Mining Journal Mining Annual Review Supplement, v. 332, no. 8537, June 25, p. 41.
Krastanova, Nadejda, 2005, Bulgaria—Foreign investments legislation: Milan, Italy, Studio Legale Sutti press release, July 14, 3 p.
Metals Insider, 2006, Bulgarian smelter to lift zinc and lead production: London, United Kingdom, Metals Insider, December 21, 21 p.
National Statistical Institute, 2007, Bulgarian economy: Sofia, Bulgaria, National Statistical Institute press release, February 4, 3 p.
OreVest plc, 2006, OreVest plc quarterly statement to 31 December 2005: London, United Kingdom, OreVest plc press release, March 26, 2 p.
Reuters, 2006, Alcoa opens consumer packaging plant in Bulgaria: London, United Kingdom, Reuters, April 27, 1 p.
Sofia Echo, The, 2006a, Alcoa opens plant in Bulgaria: The Sofia Echo, September 27, 1 p.
Sofia Echo, The, 2006b, Belene power plant construction begins immediately in Bulgaria: The Sofia Echo, November 30, 1 p.
Sofia Echo, The, 2006c, Bulgaria signs Bourgas-Alexandroupolis agreement by end of 2006: The Sofia Echo, September 5, 1 p.
Sofia Echo, The, 2006d, Bulgaria's Kremikovtsi stops polluting by 2011: The Sofia Echo, August 25, 1 p.
Sofia Echo, The, 2006e, Bulgaria's mining business fails meeting EU ecological standards: The Sofia Echo, August 18, 1 p.
Stomana S.A., 2006, Stomana II: Pernik, Bulgaria, Stomana S.A. press release, June 15, 3 p.

ROMANIA

Romania's production of metals (aluminum, copper, lead and zinc, manganese, and steel and ferroalloys), industrial minerals, and mineral fuels was mainly of regional importance.

Minerals in the National Economy

In 2006, Romania's real gross domestic product (GDP) increased by 7.7% compared with that of 2005. Industrial production increased by about 5.7% and accounted for about 24% of the GDP (National Institute of Statistics, 2007, p. 1; U.S. Central Intelligence Agency, 2007, p. 472). The Government of Romania continued to develop policies that were aimed at reforming the industrial sector both to increase its competitiveness in preparation for privatization and entry into the European Union (EU) and to abate pollution from mine-based point sources.

Government Policies and Programs

Certain policies that were promulgated in 2004 remained in effect in 2006; these included giving greater impetus to the reformation of Romania's mining industry. A published plan to streamline the mining sector called for the closures of mines that produced fuel and nonfuel minerals. Romania's requirements for accession to the EU stimulated the Government to develop these plans in an effort to reduce and (or) eliminate mining sector subsidies, which in 2004 amounted to about $150 million. In April 2005, the Government adopted the 2004-2010 Mining Sector Strategy (MSS), which planned to eliminate all subsidies to metal and industrial mineral mining operations by 2007; subsidies to coal mining enterprises were to be eliminated by 2010 (World Bank, The, 2004, p. 1).

The MSS set short-, medium-, and long-term phases to implement the reforms. In the short term (yearend 2004), regulations were developed to convert the mining industry to a full market-based system from remaining aspects of central economic planning; these regulations stipulated transparency and accountability on all parts of the mining sector. In the medium-term phase (2005-06), the Government was to restructure the parts of the mining sector that were scheduled for closure and allocate their financial resources and assets to more-profitable mining enterprises that were to be privatized. The medium-term phase also was to include the organization of oversight agencies to supervise mine site reclamation and environmental rehabilitation. The long-term phase (2006-10) would implement the full elimination of state subsidies to the mining industry and the closure of up to 31 uneconomic mining operations (World Bank, The, 2004, p. 26). Additional environmental issues included a remediation project at the Vermesti Mine, which had produced brown coal until its closure in 1997. The project was funded by a $45 million loan (issued on August 31, 1999) from the International Bank for Reconstruction and Development. These issues included claims that the reclamation project at Vermesti did not adequately assess environmental degradation in the lands surrounding the mine and increased the possibility of flooding in the region (International Bank for Reconstruction and Development, 2006).

The metal mining and processing operations identified for closure by the MSS included the following enterprises: the Balan Central Mine (underground copper ore extraction), Harghita County; the Borsa Beneficiation Plant (treatment of copper, gold, and silver ore), Maramures County; the Burloia Central Gura Baii Superior (underground copper, lead, and zinc ore extraction), Maramures County; the Buturuosa Baia de Aries Mine (underground copper, gold, and silver ore extraction), Alba County; the Fagu Cetatii Mine (underground copper ore extraction), Harghita County; the Poiana Orizont 110 Mine (underground copper ore extraction), Harghita County; and the Santimbru Mine (open pit extraction of mercury ore), Harghita County.

Among industrial mineral mining enterprises, the MSS designated the Calamani Negoiu Mine in Suceava County for closure; the mine extracted sulfur by open pit and underground method. The closure of bituminous coal mining and processing facilities in Hunedoara County included the Aninoasa Mine (underground), the Balomir Mine (open pit), the Iscroni-Livenzi Sud Mine (underground), the Uricani 5 Est Mine (underground), and the Valea de Brazi Mine (underground). Beneficiation plants for bituminous coal in Hunedoara County that were designated for closure included the Lupeni, the Petrila, and the Uricana plants. Lignite mines slated for closure included the Bodos Mine (open pit), Covasna County; the Budoi Mine and Briqueting Plant (underground), Bihor County; and the Racos Put Mine and Briqueting Plant (underground), Covasna County (World Bank, The, 2004, p. 36-47).

Production

Compared with 2005, major production gains in the metals sector in 2006 included those for primary aluminum (6%),

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primary refined copper (4%), and crude steel (12%). Analogously, production declines centered mainly on pig iron (3.2%), primary refined lead (14.6%), and primary and secondary smelted zinc (23%).

Structure of the Mineral Industry

Table 4 lists information on important Romanian mineral facilities.

Commodity Review

Metals

Aluminum.—In 2006, total aluminum production increased by almost 6% compared with that of 2005. At yearend 2005, Romania's primary aluminum producer, SC Alro S.A. (Alro), announced the acquisition of a majority stake in Alum S.A. Alro indicated that investment for modernizing Alum would continue (International Bank for Reconstruction and Development, 2006). The integration of the two companies proceeded in 2006 and included investments by Alro in alumina loading and storing equipment and pollution control technologies at the Alum alumina operation (Marco Group, 2006).

Copper.—Copper was mined in the northeastern part of the country (mainly at the Baia Sprie, the Cavnic, and the Lesul Ursului Mines), and in the southwestern part of the country (the major mines were the Moldova Noua, the Rosia Poieni, and the Rosia Montana Mines). Generally, such major producing mines as Moldova Noua and Rosia Poieni were hoisting ore that graded about 0.35% copper or less. Concentrates from these areas were smelted and refined at Baia Mare and Zlatna. At Baia Mare, SC Allied Deals Phoenix SA operated an Outokumpu flash smelter, an electrolytic copper refinery, and a continuous caster. At Zlatna, SC Ampelum SA processed copper concentrates and operated a smelter and an electrolytic refinery (Moreno, 2000, p. 57).

In 2006, Romania's output of copper in concentrate declined by about 18% compared with that of 2005. The production of primary refined copper increased by about 4% (table 3).

Gold.—European Goldfields Ltd. continued exploration and evaluation work at Certej. In 2006, European Goldfields published a new reserve estimate. Probable gold reserves at Certej were estimated to be 27.7 million metric tons (Mt) at average grades of 2.0 grams per metric ton (g/t) gold and 11.6 g/t silver. The reserve estimation was based on a gold price of $425 per troy ounce and a silver price of $7 per troy ounce. Also, studies at Certej indicated an open pit mining method (with a strip ratio of 2.6:1) that would process about 3 million metric tons per year (Mt/yr) of ore to yield 249,000 metric tons per year (t/yr) of concentrate. The annual concentrate output, with an average grade of 21 g/t gold and 125 g/t silver (at 88% recovery) would contain about 170,000 troy ounces of gold. The capital cost of Certej's development was estimated to be about $69 million (European Goldfields Ltd., 2006; Mining Journal, 2006).

Preparatory work by Gabriel Resources Ltd. of Canada for modernizing mining operations at the Rosia Montana gold deposit continued in 2006. Final environmental permitting documentation and detailed engineering plans for the new mine were submitted to the Government during the first half of 2006 (Gabriel Resources Ltd., 2006a; Reuters, 2006). According to Gabriel spokespersons, gold production could start in late 2008 or early 2009; at full capacity, the mine could produce up to 15,600 kilograms per year (kg/yr) of gold. Rosia Montana quartz-vein ore hosts electrum as the main gold mineral (Reuters, 2005; Manske and others, 2006). Issues that impeded rapid development of the Rosia Montana project and needed resolution included regional environmental protection; local social concerns, which included minimizing resettlement; and the protection of historical and archaeological sites (Richards, 2005). In 2006, the Romanian Supreme Court ruled that the lower court decision to deny Gabriel the right to proceed with its mine development agenda was not properly handled. The Supreme Court ordered the lower court to reexamine the Gabriel case on its merits alone and allow Gabriel to provide necessary evidence and arguments (Gabriel Resources Ltd., 2006b).

Carpathian Gold Inc. of Canada actively conducted exploration for gold under license in the Apuseni Mountains (Golden Quadrilateral); at the Colnic gold/copper porphyry deposit near Rovina; at Baia Mare in the northwest in the contiguous Firiza-Rotunda and Rotunda-Varatec area [in a joint venture with Romania's state-owned REMIN S.A. mining company (quartz-vein-type ore)]; and at the Oravita license at Banat in southwestern Romania (gold/copper porphyry). In 2006, analysis of drill core from the Colnic prospect showed gold values ranging from 0.86 to 4.35 g/t, and copper, from 0.05% to 0.14% (Carpathian Gold Inc., 2006a, b).

Iron and Steel.—Romania's iron and steel production in 2006 had mixed results. The output of pig iron declined by about 3% compared with that of 2005; steel output increased by more than 12% (table 3). Domestic production of iron ore ceased in 2005, which necessitated total reliance on imported raw materials. Romania's net imports of iron ore for the 2002 to 2006 period were about 6.2 Mt, 7 Mt, 6.6 Mt, 6.6 Mt, and 5.2 Mt, respectively. The country's consumption of crude steel during the same period was 3.4 Mt, 3.7 Mt, 3.9 Mt, 4.0 Mt, and 5.1 Mt, respectively (International Iron and Steel Institute, 2007).

Lead and Zinc.—Relatively low-grade lead and zinc ores were produced at underground mines in the Baia Mare, the Borsa, the Certej, and the Rodna districts; the ores graded between 0.4% lead and 0.6% zinc and 1.0% lead and 1.2% zinc. Romania's lead and zinc ores also contained copper (0.35%), and associated antimony, bismuth, cadmium, gold, and silver. Because of the complex mineralogy of the lead and zinc ores, concentrates produced from them have varied widely with respect to metal content. Metal recovery from concentrates has ranged from 50% to 75% for lead and zinc. Smelting and refining of lead and zinc from domestic and imported ores and concentrates was carried out at the Sometra S.A.'s Imperial smelter at Copsa Mica. The decline in output of both metals, which was apparent in 2005, continued in 2006; the reported mine production of lead and zinc (in concentrate) declined by about 35% and 30%, respectively, compared with production levels reached in 2005 (table 3). The output of primary refined

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lead declined by about 15%; zinc metal production (primary and secondary) declined by about 33% compared with that of 2005 (table 3).

Industrial Minerals

Romania was known to have a broad range of industrial minerals that included barite, various calcareous rocks, clays, feldspar and mica of granitic/pegmatitic sources, graphite, gypsum, salt, and silica-group minerals. Seven privately owned companies and one state-owned company were involved in the mining and quarrying of industrial minerals. The modernization of the country's economy and infrastructure was expected to increase the domestic demand for industrial minerals and construction materials.

Mineral Fuels

The petroleum and refining industries historically have been among Romania's leading industrial sectors. Although small by world standards, the petroleum industry continued to be an important factor in the country's energy balance. Estimates of petroleum resources have ranged from 1.0 billion to 1.6 billion metric tons. The extraction of crude petroleum in recent years, however, has exhibited a declining trend. According to the latest available data (from 2002 through 2006, inclusive), petroleum output declined each year by about 3% and 5%, respectively, compared with the preceding year (table 3). The output of natural gas has shown a similar declining trend in production. Lignite accounted for almost 100% of the total amount of coal produced in Romania in 2006.

Outlook

Romania's application to join the EU carries a broad range of requirements, which include modernization of industrial plant and infrastructure. To meet these requirements, Romania is expected to continue to develop its industrial minerals sector, including quarries and processing facilities for the production of construction materials. As in Bulgaria, gold exploration is expected to continue to be an important aspect of foreign investment in the country's mineral industry.

References Cited

Carpathian Gold Inc., 2006a, Carpathian Gold Inc. commences drilling on the 2nd porphyry Cu+Au system on the Rovina license, central Romania: Toronto, Ontario, Canada, Carpathian Gold Inc. press release, June 8, 2 p.

Carpathian Gold Inc., 2006b, Carpathian Gold Inc. intersects: Toronto, Ontario, Canada, Carpathian Gold Inc. press release, March 1, 3 p.

European Goldfields Ltd., 2006, European Goldfields—Reserves announced for Certej project: Toronto, Ontario, Canada, European Goldfields Ltd. press release, April 10, 5 p.

Gabriel Resources Ltd., 2006a, Rosia Montana EIA filed with Romanian Government: Toronto, Ontario, Canada, Gabriel Resources Ltd. press release, May 18, 2 p.

Gabriel Resources Ltd., 2006b, Two court cases decided in favor of Rosia Montana: Toronto, Ontario, Canada, Gabriel Resources Ltd. press release, July 12, 2 p.

Ianovici, V., and Borcos, M., 1982, Romania, *in* Mineral deposits of Europe—Southeast Europe: London, United Kingdom, The Institute of Mining and Metallurgy and the Mineralogical Society, p. 55-57.

International Bank for Reconstruction and Development, 2006, Request for inspection—Romania—Mine closure and social mitigation project report and recommendation: Washington, DC, World Bank Group report no. INSP/R2006-0003, March 22, p. 1-12.

International Iron and Steel Institute, 2007, Steel statistical yearbook 2007: Brussels, Belgium, International Iron and Steel Institute, 104 p.

Manske, S.L., Hendequist, J.W., O'Connor, Gary, Tamas, Calin, Cauuet, Beatrice, Leary, Steven, and Minut, Adrian, 2006, Rosia Montana, Romania—Europe's largest gold deposit, *in* SEG newsletter: Littleton, Colorado, Society of Economic Geologists, no. 64, January, p. 11-14.

Marco Group, 2006, Alro starts merger with Alum: Tulcea, Romania, Marco Group, June 9, 1 p.

Mining Journal, 2006, Certej reserves for European Goldfields: Mining Journal, April 3, p. 10.

Moreno, Anne-Marie, ed., 2000, Non-ferrous metal works of the world (9th ed): London, United Kingdom, Metal Bulletin Books Ltd., 762 p.

National Institute of Statistics, 2007, Monthly statistical bulletin: Bucharest, Romania, National Institute of Statistics, January, 190 p.

Reuters, 2005, Gabriel sees Romania gold mine in 2008/09: London, United Kingdom, Reuters, November 15, 2 p.

Reuters, 2006, Canada's Gabriel submits Romanian gold mine study: London, United Kingdom, Reuters, May 18, 1 p.

Richards, Jeremy, 2005, Rosia Montana gold controversy, *in* Mining environmental management: London, United Kingdom, Mining Communications Ltd., p. 5-13.

U.S. Central Intelligence Agency, 2007, Romania, *in* World factbook 2007: U.S. Central Intelligence Agency, 700 p.

World Bank, The, 2004, Project appraisal on proposed loan in the amount of US$120 million equivalent to Romania for a mine closure, environmental and socio-economic regeneration project: Washington, DC, The World Bank report no. 30517-RO, November 18, 85 p.

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TABLE 1
BULGARIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2002	2003	2004	2005	2006
METALS						
Aluminum, metal, secondary		2,000	2,000	2,000 e	2,000 e	2,000 e
Bismuth, metal e	thousand metric tons	40	40	30	35 r	30
Cadmium, metal, smelter		345	307	356	350	350 e
Copper:						
Ore:						
Gross weight	thousand metric tons	26,030	26,415	23,879	24,807	29,572
Cu content e	do.	112	116	107 [3]	112	133
Concentrate:						
Gross weight	do.	464	458	398	470	502
Cu content	do.	93	92	80	94	101
Metal, primary and secondary:						
Smelter		181,000	215,300	227,100	240,100	250,500
Refined, electrolytically		40,000	42,000	52,500	60,500	65,500
Gold, metal	kilograms	2,612	2,142	2,431	3,868	3,818
Iron and steel:						
Iron ore:						
Gross weight	thousand metric tons	373	466	83	--	--
Fe content	do.	105 e	127	27	--	--
Iron concentrates	do.	167	248	52 e	--	--
Metal:						
Pig iron for steelmaking	do.	1,072	1,386	1,158 r	1,081 r	1,200 e
Ferroalloys, ferrosilicon e	do.	10	10	10	10	10
Steel, crude	do.	1,860	1,950	2,106	1,969 r	2,000 e
Semimanufactures, rolled	do.	1,035 r	1,206 r	1,391 r	1,452 r	1,400 e
Lead:						
Mine output, Pb content		24,000	31,000	25,000	32,000	28,000
Concentrate:						
Gross weight		31,108	35,200	29,900	31,500	25,387
Pb content e		21,800	24,600	19,000	22,000	18,000
Metal, refined, primary and secondary		66,000	74,000 r	69,000 r	93,500 r	84,300
Manganese ore:						
Gross weight		4,000	4,000	28,000	39,000	20,000
Mn content e		1,100	1,100	7,600	10,900	5,600
Silver, mine output, Ag content		60	50	60	60	60
Tin, metal e		10	10	10	10	10
Uranium oxide, U content e		600	600	600	600	600
Zinc:						
Mine output, Zn content e		25,800	31,000	19,000	22,000	17,000
Concentrate:						
Gross weight		28,672	26,000	29,900	33,700	25,917
Zn content e		14,900	18,800	15,500	17,500	13,500
Metal, smelter, primary and secondary		83,000	86,800	101,500	92,500 r	85,900
INDUSTRIAL MINERALS						
Asbestos, fiber, all grades e		300	300	237	--	--
Barite ore, run-of-mine		656,000	637,000	237,000 e	-- r	--
Cement, hydraulic	thousand metric tons	2,137	2,100	2,100	2,100	2,000
Clays:						
Bentonite	do.	212	146	225	181	216
Kaolin, raw	do.	1,026	1,137	1,291	1,381	1,658
Refractory	do.	38	40	30	30	15
Feldspar	do.	34	4	5	5	38
Fluorspar e	do.	2	2	2	2	2
Gypsum and anhydrite:						
Crude	do.	156	168	176	188	216
Calcined e	do.	50	50	60	65	75

See footnotes at end of table.

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TABLE 1—Continued
BULGARIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2002	2003	2004	2005	2006
INDUSTRIAL MINERALS—Continued						
Lime, industrial	thousand metric tons	1,156	1,500	1,500	1,500	1,400
Limestone and dolomite[e]	do.	3,500 [r]	3,500 [r]	3,500 [r]	3,265 [r, 3]	3,340 [3]
Nitrogen, N content of ammonia	do.	328	321	320	320	309
Perlite	do.	11	17	8	15	5
Pyrites, gross weight[e]	do.	150	150	150	150	150
Salt, all types	do.	1,800	1,882	1,900	1,900	2,000
Sand and gravel	thousand cubic meters	2,385	2,098	3,333	3,628	4,293
Silica, quartz sand	thousand metric tons	607	412	545	583	250
Sodium carbonate, calcined[e]	do.	800	800	800	800	800
Sulfur:[e]						
S content of pyrites		30,000	30,000	25,000	25,000	25,000
Byproduct		245,000	289,000	301,000	300,000	300,000
Total		275,000	319,000	326,000	325,000	325,000
Sulfuric acid		751,018	750,000	750,000 [e]	750,000 [e]	750,000 [e]
Zeolite[e]		15,000	15,000	15,000	15,000	15,000
MINERAL FUELS AND RELATED MATERIALS						
Coal, marketable:						
Anthracite	thousand metric tons	13	9	--	--	--
Bituminous	do.	109	44	170	96	52
Brown	do.	3,232	3,044	3,071	2,620	2,557
Lignite	do.	23,202	24,597	23,385	22,193	22,750
Total	do.	26,556	27,694	26,626	24,909	25,359
Coke[e]	do.	1,200	1,200	1,200	1,200	1,200
Natural gas, marketed	million cubic meters	11	11	333	537	519
Petroleum:						
Crude, reported	thousand metric tons	33	27	30	27	25
Refinery products[e]	thousand 42-gallon barrels	25,000	25,000	25,000	25,000	25,000

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. -- Zero.

[1]Table includes data available through November 2007.

[2]In addition to the commodities listed, chromite, magnesite, palladium, platinum, tellurium, uranium, and a variety of crude construction materials (common clays, dimension stone, and crushed stone) are produced, but available information is inadequate make reliable estimates of output.

[3]Reported figure.

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TABLE 2
BULGARIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity
Bentonite, mine output	Bentonite AD	Kardjali	280.
Cement	Reka Devnia	Devnia	1,825.
Do.	Zlatna Panega	Panega	1,300.
Do.	Others	Temelkovo, Dimitrovgrad, Pleven, and Beli Izvor	1,590.
Coal:			
Bituminous	Economic Mining and Power Combine (SMEK) Balkanbass	Balkan coal basin in central Bulgaria, northwest of Silven	445.
Brown	G. Dimitrov	Pernik coal basin, southwest of Sofia	4,000.
Do.	Others	Bobov Dol and Pirin in western Bulgaria	3,100.
Lignite	SMEK East Maritsa	East Maritsa coal basin near Zagora	25,000.
Do.	Others	Marbas, Pernik, and Bobov Dol coal basins	5,300.
Copper:			
Concentrate, Cu content	Asarel-Medet AD	Panagurishte, Pazardzhik District	55.
Do.	Chelopech Ltd.	Srednogorie, Sofia District	10.
Do.	Bradtze	Malko Turnovo	2.
Do.	Elatzite-Med Ltd.	Srednogorie, Sofia District	20.
Do.	Rosen	Burgas, near the Black Sea	1.
Do.	Tsar Asen	Srednogorie, Sofia District	2.
Do.	Burgaskii Mines Ltd., Zidorovo	Burgas, near the Black Sea	0.5.
Metal:			
Smelter	Cumerio Med S.A. (Pirdop)	Srednogorie, Sofia District	150.
Refined	do.	do.	30.
Iron ore	Kremikovtzi Iron and Steel Works	Kremikovtzi	2,000.
Kaolin, mine output	Kaolin AD	Senovo, Rousse District	250.
Lead-zinc:			
Concentrate, Pb-Zn content	Gorubso Co.	Erma Reka, Kurdjali, Laki, and Rudozem, all in Madan area near Greek border	59 lead, 47 zinc.
Do.	Madzharovo Ltd.	Near Plovdiv	3 lead, 2 zinc.
Do.	Ossogovo Ltd.	Ossogovo Mountains, western Bulgaria	3 lead, 2 zinc.
Do.	Ustrem Ltd.	Near Thundza River, eastern Bulgaria	3.5 lead, 0.8 zinc.
Metal:			
Pb, refined	KCM SA [formerly Dimitur Blagoev]	Plovdiv	44.
Do.	Lead and Zinc Complex Ltd.	Kurdjali	60.
Zn, smelter	KCM SA [formerly Dimitur Blagoev]	Plovdiv	60.
Do.	Lead and Zinc Complex, Ltd.	Kurdjali	30.
Manganese ore	Mangan Ltd. (Obroschishte)	Varna District	50.
Natural gas	Ministry of Power Supply	Chiren field, in northwest Bulgaria	(1)
Perlite, mine output	Bentonite AD	Kardjali	30.
Petroleum:			
Crude	do.	do.	(1)
Refined	Economic Trust for Petroleum Products	Refineries in Burgas, Pleven, and Ruse	260,000.
Steel, crude	Kremikovtzi Iron and Steel Works	Near Sofia	2,300.
Do.	Stomana Iron and Steel Works	Pernik	1,300.
Zeolite, mine output	Bentonite AD	Kardjali	15.

[1] Insignificant capacity.

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TABLE 3
ROMANIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2002	2003	2004	2005	2006
METALS						
Aluminum:						
Alumina, calcined, gross weight		361,407	332,852	559,307	688,829	650,000
Ingot including alloys:						
Primary		187,052	196,844	222,347	243,605	258,000
Secondary		3,308	7,892	6,506	7,109	7,000
Total		190,360	204,736	228,853	250,714	265,000
Bismuth, mine output, Bi content[e]		40	40	40	40	40
Copper:						
Mine output, Cu content of concentrate		18,962	23,389	20,380	14,868	12,200
Metal:						
Smelter:						
Primary		8,871	4,456	61	--	--
Secondary[e]		2,000	500	10	10	10
Total		10,871	4,956	71	10	10
Refined:						
Primary		11,453	16,739	24,526	20,739	21,581
Secondary[e]		2,000	2,000	2,000	2,000	2,000
Total		13,453	18,739	26,526	22,739	23,581
Gold, mine output, Au content[e]	kilograms	500	400	400	400	400
Iron and steel:						
Iron ore:						
Gross weight	thousand metric tons	342	304	275	265	300
Metal content	do.	89	82	74	69	80
Metal:						
Pig iron	do.	3,979	4,101	4,244	4,098	3,966
Ferroalloys, electric furnace:						
Ferromanganese		--	--	191	18,625	18,000
Ferrosilicomanganese		84,720	141,899	194,754	100,957	100,000
Silicon metal[e]		200	100	--	--	--
Total		84,920	141,999	194,945	119,582	118,000
Steel, crude	thousand metric tons	5,491	5,692	6,077	5,632	6,318
Semimanufactures:						
Pipes and tubes	do.	562	453	486	396	400
Rolled products	do.	3,907	4,757	5,191	5,196	5,200
Lead:						
Mine output, Pb content of concentrate		15,136	15,747	18,297	11,610	7,500
Smelter, primary[e]		15,000	16,000	19,000	12,000	7,000
Refined:[e]						
Primary		23,100	23,100 [3]	32,590 [3]	32,903 [3]	28,100
Secondary		3,000	5,000	5,000	5,000	5,000
Total		26,100	28,100	37,590 [3]	37,903 [3]	33,100
Manganese:						
Ore, gross weight	thousand metric tons	60 [e]	90	95	95 [e]	95 [e]
Concentrate:[4]						
Gross weight[e]	do.	40	60	65	65	65
Mn content	do.	12	15	16	14	14
Silver, mine output, Ag content		15 [e]	18	18 [e]	15	18
Zinc:						
Mine output, Zn content of concentrate		21,250	22,081	23,599	13,784	9,574
Metal, smelter, primary and secondary		51,600	48,000	52,746	49,447	43,705
INDUSTRIAL MINERALS						
Barite, processed		100	23	--	--	--
Cement, hydraulic	thousand metric tons	5,680	5,992	6,239	7,032	7,000 [e]

See footnotes at end of table.

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TABLE 3—Continued
ROMANIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2002	2003	2004	2005	2006
INDUSTRIAL MINERALS—Continued						
Clays:						
Bentonite:						
Run of mine[e]		40,000	40,000	40,000	40,000	40,000
Marketable		15,389	17,637	18,161	17,890	20,299
Kaolin:						
Run of mine[e]		71,000	70,000	70,000	65,000	65,000
Marketable		22,517	21,724	22,337	20,266	10,790
Diatomite		20,922	33,296	20,626	1,017	--
Feldspar		51,959	72,827	60,924	56,817	37,553
Fluorspar[e]		15,000	15,000	15,000	15,000	15,000
Graphite		1,001	1,014	395	478	--
Gypsum	thousand metric tons	421	410	490 [r]	502	599
Lime	do.	1,918	1,936	1,978 [r]	1,916	1,900 [e]
Nitrogen, N content of ammonia	do.	930	1,180	1,182 [r]	2,107	2,000 [e]
Pyrites, gross weight[e]	do.	70	70	70	70	70
Salt:						
Rock	do.	46	47	43	46	46
Other	do.	2,211	2,370	2,357	2,374	2,374
Total	do.	2,257	2,417	2,400	2,420	2,420
Sand and gravel	do.	761	3,061	3,900	2,421	2,421
Sodium compounds, n.e.s.:						
Caustic soda	do.	343	382	414	443	443
Soda ash, manufactured, 100% Na_2CO_3 basis	do.	454	407	402	347	347
Sulfur, byproduct, all sources[e]	do.	200	200	200	200	200
Sulfuric acid	do.	58	65	28	11	11 [e]
Talc		7,310	10,082	9,725	6,760	2,967
MINERAL FUELS AND RELATED MATERIALS						
Carbon black		8,106	2,000	2,000	2,000	2,000
Coal, washed:						
Anthracite and bituminous	thousand metric tons	13	10	1	--	--
Of which, for coke and semicoke production[5]	do.	13	10	1	--	--
Brown	do.	245	240	112	52	50
Lignite	do.	30,154	32,813	31,479	31,070	30,000
Total	do.	30,412	33,063	31,592	31,122	30,050
Coke:						
Metallurgical	do.	1,680	1,550	1,573	1,777	1,500
Other	do.	186	88	--	--	--
Total	do.	1,866	1,638	1,573	1,777	1,500
Gas, natural, gross:						
Associated	million cubic meters	1,403	1,345	1,267	1,220	1,200
Nonassociated	do.	12,244	11,829	12,023	11,252	11,500
Total	do.	13,647	13,174	13,290	12,472	12,700
Petroleum:						
Crude:						
As reported	thousand metric tons	5,810	5,651	5,465	5,212	5,200
Converted	thousand 42-gallon barrels	44,000	42,500 [e]	41,000	40,000	40,000
Refinery products[e]	do.	75,000	75,000	75,000	70,000	70,000

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. -- Zero.

[1]Table includes data available through November 2007.

[2]In addition to the commodities listed, antimony, asbestos, and a variety of construction materials are produced, and molybdenum may have been produced as a byproduct of copper from 1988 on; output is not reported quantitatively and available information is inadequate to make reliable estimates of output.

[3]Reported figure.

[4]Estimated series are based on published data for concentrate production.

[5]To avoid double counting, data not included in total coal production.

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TABLE 4
ROMANIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies (Government-owned unless otherwise specified)	Location of main facilities	Annual capacity
Alumina	Soc Com Alor SA	Plant at Oradea, near Hungarian border	250.
Do.	BBG Alum S.A. (51% owned by the Balli Group of the United Kingdom and the Bayrakter Co. of Turkey)	Plant at Tulcea, Danube Delta	400.
Aluminum, primary	SC Alro S.A. (Slatina Aluminium Enterprise)	120 kilometers west of Bucharest	270.
Barite	Ministry of Industry	Ortra Mine, Rosia Montana, southwest of Cluj	100.
Bauxite	do.	Oradea-Dobresti Mining Complex, near Hungarian border	350.
Cement	Cimentul SA Turda	Plant at Turda, 600 kilometers from Port of Constanta	cement, 1,360; clinker, 850.
Do.	Cimentul SA Cimus	Plant at Cimpulung, about 499 kilometers from Port of Constanta	cement, 2,200; clinker, 1,360.
Do.	Moldocim SA Bicaz	Plant at Bicaz, about 450 kilometers from Port of Constanta	cement, 3,100; clinker, 1,520.
Do.	Romcif SA Fieni	Plant at Fieni, about 420 kilometers from Port of Constanta	cement, 1,600; clinker, 960.
Do.	Romcim SA	Plant at Alesd, 812 kilometers from Port of Constanta	cement, 3,500; clinker, 2,120.
Do.	do.	Plant at Hoghiz, 437 kilometers from Port of Constanta	cement, 2,200; clinker, 1,520.
Do.	do.	Medgidia plant, about 35 kilometers west of Constanta	cement, 3,500; clinker, 1,980.
Do.	do.	Plant at Jiu, about 533 kilometers from the Port of Constanta	cement, 3,000; clinker, 2,045.
Coal:			
Bituminous	Compania Nationala a Huilei-Petrosani	Valea Jiului Mining Complex, near Hunedoara	10,400.
Lignite	Societatea National a Lignitului Oltenia-Targu Jui	Jiu Valley, Oltenia County, north of Craiova	20,300.
Do.	Societatea National a Carbunelui-Ploiesti	About 50 kilometers north of Bucharest	8,700.
Copper:			
Ore (concentrate)	Compania Nationala REMIN S.A. and Compania Nationala Minvest	Baia Mare, Baia Sprie, and Cavnic Mines, northwestern area near the Ukrainian border; Rosia Montana, Noud, Borsa Balan, and Lesul Ursului Mines—in east-west arc along Carpathian range; Rosia Poieni Mine; and Moldova Noua Mine, southwest near Danubian border with Yugoslavia	180.
Metal	SC Allied Deals Phoenix SA	Outokumpu flash smelter and electrolytic refinery at Baia Mare in the Northwestern area, near the Ukrainian border	40.
Do.	SC Ampelum SA	Zlatna smelter and refinery, Apuseni, northwest Romania	13.
Ferroalloys	Ferom-Joint Stock Co.	Complex at Tulcea	280.

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TABLE 4—Continued
ROMANIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies (Government-owned unless otherwise specified)	Location of main facilities	Annual capacity
Iron ore		Compania Nationala Minvest	Mining complex at Hunedoara, in west-central Romania	1,320.
Do.		do.	Resita Mining Complex, southwestern Romania, near Yugoslav border	660.
Do.		do.	Napoca-Cluj Mining Complex, northwestern Romania on the Somesul River	990.
Lead:				
In ore		Compania Nationala REMIN S.A.	Baia Mare Mine, near Ukrainian and Hungarian borders	24.
Do.		Compania Nationala Minvest	Balan Mine, 50 kilometers southwest of Piatra Neamt	10.
Metal		Sometra S.A.	Imperial Smelter at Copsa Mica, central Romania, on the Tirnava Mare River	42.
Natural gas	million cubic feet per year	Ministry of Industry, Department of Energy	Tirgu Mures Field at Tirgu Mures, north-central Romania	996,000.
Do.	do.	do.	Ploesti Field, 50 kilometers north of Bucharest	249,000.
Petroleum:				
Crude	42-gallon barrels per day	do.	Ploesti-Teleajen, Pitesti, and Tirgoviste Fields, in Prahova Valley around Bucharest; Bacau Field at Bacau, east-central Romania near the Siretul River; and West Carpathian Field, southeastern Carpathian Mountains, between the west bank of the Olt River and Tirgu Jiu	250,000.
Refined	do.	do.	Refineries at Brazil, Pitesti, Onesti, Barcau, Borzesti, Brasov, Cimpina, Darmanesti, Oradea, Ploesti, Teleajen, and Navodari	664,000.
Steel		Gavazzi Steel SA (formerly Otel Rosu)	Caras-Severin, southeastern region, near Yugoslav border	400.
Do.		Mechel Campia Turzii SA	Campia Turzii, Cluj, northwestern Romania	300.
Do.		Ispat Sidex SA Galati (Ispat, India and United Kingdom)	Danube River, north of Brail, near the Ukrainian border	10,000.
Do.		Siderurgica SA Hunedoara (LNM Holdings NV, United Kingdom)	West-central Romania, near Calan	2,135.
Do.		CSR S.A. Resita	Southwestern Romania, about 20 kilometers southwest of Caransebes	1,200.
Do.		Siderica SA Calarasi	Near the Bulgarian border close to the Danube	2,200.
Do.		Mechel Targoviste	Targoviste, Dimbovita, near Bucharest	450.
Zinc:				
In ore		Compania Nationala Minvest	Baia Mare, near Ukrainian and Hungarian borders	60.
Metal		Sometra S.A.	Imperial Smelter at Copsa Mica, Tirnava River, central Romania	66.

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The Mineral Industries of the Southern Balkans

Albania, Bosnia and Herzegovina, Croatia, Macedonia, Montenegro, Serbia, and Slovenia

By Walter G. Steblez[1]

Europe's Southern Balkan (Adriatic) region is part of the southern Mediterranean Alpine folded zone, which extends through the Dinarides of the former Yugoslavia (Bosnia and Herzegovina, Croatia, Macedonia, Serbia and Montenegro, and Slovenia), the Albanides of Albania, and the Hellenides of Greece. Mining for base and precious metals may be traced through historical records to at least 5th century B.C. Evidence of early workings at the Bor copper deposit in Serbia suggests prehistoric origins.

Until the early 1990s, the mining, processing, and downstream use of base metals established the region as a major European source of copper, lead, and zinc and a major world producer of chromite. The transition of the region from central economic planning to market economy systems between 1991 and 2001 also began a swift deconstruction of existing political and social structures, most notably the settlement of the former Yugoslav territory into fully sovereign countries from the previously united republics. The ensuing political, social, and ethnic tensions and conflict destroyed or degraded much of the region's mineral industries and industrial infrastructure. In 2006, Serbia and Montenegro ceased to exist following a formal referendum in Montenegro that resulted in Montenegro's status as an independent state. Also, in 2006, despite a reduction of political and social tensions in Serbia's Province of Kosovo, separatist aspirations on the part of Kosovo's Albanian majority remained significant. The future status of the mineral industries in the countries of the Adriatic Balkan region may become clearer following a political settlement and normalization not only among the states in the region, but also within these states, especially Bosnia and Herzegovina, Croatia, Macedonia, and Serbia.

ALBANIA

Albania's mineral deposits included such metalliferous mineral commodities as chromite, copper ore, and nickeliferous iron ore and such mineral fuels as natural gas and petroleum.

Minerals in the National Economy

The decline in Albania's overall mineral production stemmed mainly from the country's transition from rigid central economic planning to a market economy; this decline began in the early 1990s and production levels had not significantly recovered by 2006.

Production

Of the metal ores, only chromite and a token amount of copper were mined in 2005. In past decades, Albania was among the world's top three producers and exporters of chromite. In 2006, the output of chromite rose by about 24% compared with that of 2005. Preliminary production data for 2006 showed that the output of ferrochromium declined by about 50% compared with that of 2005 (table 1).

Structure of the Mineral Industry

All of Albania's existing mineral facilities remained under state ownership (table 2). Private companies, however, were conducting exploration programs for nickel.

Commodity Review

Metals

In late 2006, European Nickel PLC (ENickel) announced exploration results for nickel and cobalt at Korce in southeastern Albania. ENickel's exploration work, which covered a permitted area of about 55 square kilometers (km^2), included 23 drill holes with a grid spacing of 1 kilometer (km) by 400 meters (m). The study delineated two nickel laterite areas in a 4-km^2 area; drill core analysis showed the mineralization to have a mean thickness of 6.3 m and an average grade of 1.01% nickel. Plans for the 2006–07 field season were to drill on a 400-m by 400-m grid to help determine the extent of the mineralization and to build an exploratory adit to obtain ore samples for testing and analysis; these iron-nickel laterite and nickel silicate deposits at Korce (near the Guri Kuq and the Prrenjas mining areas) are mainly overlain by Eocene carbonate molasse (Pumo and others, 1982; Bankside Consultants, 2006).

Industrial Minerals

Dolomite, gypsum, kaolin, marble, phosphate rock, and other industrial minerals had been worked only intermittently during the past several years. In 2006, the chief event in the industrial mineral sector was the operational startup of a 1.3-million-metric-ton-per year (Mt/yr) clinker production line at the Fushe Kruje cement plant. The new $130 million clinker line, which was described as the "largest direct foreign investment in Albania's manufacturing industry since the country's

[1]Deceased.

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transition to a market economy," was designed to eliminate clinker imports and raise the production output of cement. Apart from the Fushe Kruje cement plant, a new cement plant was to be financed by the European Bank for Reconstruction and Development (23%), the International Finance Corporation (World Bank Group) (23%), the OPEC Fund for Reconstruction and Development (14%), and Alpha Bank of Greece (8%). The Titan Cement Group of Greece, which was a major cement exporter to Albania, also applied for a permit with the Albanian Government in late 2006 to build a new cement plant (Building Bulletin, 2006).

Mineral Fuels

In 2006, exploration for oil and gas and the development of new wells at the Marinza and the Patos oilfields continued. In 2006, Bankers Petroleum Ltd., which had a 25-year license agreement with the Government of Albania to modernize and develop the Patos-Marinza oilfields, reported petroleum resources to be about 1.96 billion barrels and current reserves to be 93 million barrels. Bankers near-term plans included increasing petroleum production to between 10,000 and 15,000 barrels per day (bbl/d) by 2009 from 5,000 bbl/d in 2006 and the construction of a pilot thermal-enhanced oil recovery operation in 2007 (Bankers Petroleum Ltd., 2007, p. 9-15).

In early 2006, Albania and Bulgaria signed an agreement to build a 917-km petroleum pipeline with a carrying capacity of 750 bbl/d from Burgas in Bulgaria to the Port of Avlona in Albania. The pipeline was designed to carry oil originating in the Caspian region to the European market (Alexander's Gas & Oil Connections, 2006).

Outlook

The development of Albania's mineral industry is contingent on such factors as the stability of social institutions, the creation of modern infrastructure, and the adoption of legislation that would attract foreign investment. International financial institutions have continued to assist Albania in developing these objectives.

References Cited

Alexander's Gas & Oil Connections, 2006, Albania and Bulgaria sign memorandum for oil pipeline: Limbach, Germany, v. 11, no. 20, October 26, 1 p.

Bankside Consultants, 2006, European Nickel drilling results—Successful programme completed in Albania: London, United Kingdom, Bankside Consultants press release, December 12, 2 p.

Bankers Petroleum Ltd., 2007, Company report: Calgary, Alberta, Canada, Bankers Petroleum Ltd., November 23, 49 p.

Building Bulletin, 2006, New Albanian line: Surrey, United Kingdom, International Cement Review, October, p. 4.

Pumo, E., Melo, V., and Ostrosi, B., 1982, Albania, *in* Mineral deposits of Europe: London, United Kingdom, The Institution of Mining and Metallurgy and The Mineralogical Society, 304 p.

BOSNIA AND HERZEGOVINA

Bosnia and Herzegovina comprised two constituent regions: the Federation of Bosnia and Herzegovina (the Federation) and Republika Srpska (RS), which accounted for about 51% and 49% of Bosnia and Herzegovina's territory, respectively. The semiautonomous status of these entities resulted from specific compromises and agreements the followed the dissolution of Yugoslavia in the 1990s and ensuing conflicts. Consequently, Bosnia and Herzegovina's mineral resources and respective mining and processing facilities were exploited in the Federation and RS under virtually separate economic environments; this resulted in the uneven restoration of the country's mineral industry.

Minerals in the National Economy

Bosnia and Herzegovina was a major industrial center and mineral producing area in the former Yugoslavia. The metallurgical sector included steel and aluminum enterprises, with the latter providing feedstock for the former Yugoslavia's heavy industries. Major local mineral resources included bauxite, iron ore, and lead-zinc ore. Resources of industrial minerals included but were not limited to asbestos, clays, gypsum, magnesite, and sand and gravel. Resources of mineral fuels included coal and minor deposits of petroleum. The dissolution of Yugoslavia in the early- to mid-1990s severed long-standing economic ties in the region; this partly accounted for a sharp reduction in mineral production. Social unrest and armed civil strife, which damaged and (or) destroyed facilities and infrastructure, further depressed Bosnia and Herzegovina's mining and processing activity.

Production

In 2006, Bosnia and Herzegovina's gross domestic product (GDP) in constant prices increased by about 10% compared with that of 2004. The value of mining and quarrying output in 2006 constituted about 2% of the GDP; the total value of mine production rose by about 14% compared with that of 2005 (Agency for the Statistics of Bosnia and Herzegovina, 2006, p. 33). In the Federation, total industrial production rose by 7.5% compared with that of 2005; mining and quarrying increased by 2%. In the RS, the total value of mining and quarrying output increased by about 20% compared with that of 2005 (Federal Office of Statistics, 2007, p. 27; Republika Srpska Institute of Statistics, 2007).

Structure of the Mineral Industry

Private companies have invested in mineral facilities in both the Federation and the RS. Table 4 is a list of the major mineral industry facilities.

Commodity Review

Metals

Aluminum.—The output of aluminum and steel continued to increase in 2006 compared with 2005; aluminum (primary and secondary) production increased by about 3.8%, and crude steel, by about 66%. In midyear, Aluminij d.d. Moster, which was

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Bosnia and Herzegovina's sole producer of aluminum, signed a contract with DaimlerChrysler and WestLB Bank of Germany and Outokumpu Oy of Finland for facility modernization and expansion. The deal, which was valued at $44 million, would raise the plant's aluminum smelting capacity to 132,000 metric tons per year (t/yr) from 120,000 t/yr. An additional agreement worth $13 million was reached with Glencore International AG of Switzerland; the work would focus on the reduction of electric power consumption and environmental protection at the aluminum plant (Metals Insider, 2006b, c). In July, the Ukio Banko Investment Group of Lithuania, which was the owner of the Birac Alumina Refinery, announced plans to build its own primary aluminum smelting operation, the capacity of which would be about 125,000 t/yr (Metals Insider, 2006a).

Iron and Steel.—Mittal Steel Zenica (Zenica) announced plans to increase crude steel production by 28% [600,000 metric tons (t)] in 2007 compared with that of 2006. The plans also called for an increase in exports of finished steel (semimanufactures) to more than 750,000 t from 377,000 t in 2006. In addition, future investments would aim to set production levels for crude steel at about 2 million metric tons per year (Mt/yr) (Reuters, 2007). In 2006, Bosnia and Herzegovina's production of iron ore increased by about 8.3% compared with that of 2005 (table 3). In midyear, Mittal acquired 51% of the Ljubija iron ore mining complex, which was the country's major iron ore mining operation in Ljubija, RS.

Industrial Minerals

In the industrial mineral sector, major production gains were reported for cement (about 20%) and salt (about 6%). The country's energy sector reported that an agreement was reached by Bosnia and Herzegovina's BH Gas and INA-Industrija Nafte d.d. Zagreb (INA) of Croatia to build a gas pipeline from Sarajevo to Ploce in Croatia on the Adriatic coast. The pipeline project was to be funded by the European Bank for Reconstruction and Development (EBRD). EBRD's outlay for this project in 2007 was reported at euro (€) 40 million ($59 million) (Petroleum Economist, 2006).

Outlook

The country's economy is expected to continue to recover as foreign investment capital continues to transect territorial boundaries. Such investment is helping to restart production in the area's mineral industries and enabling the reestablishment of industry's linkages to former commercial partners, which were terminated during the civil strife of the mid-1990s.

References Cited

Agency for the Statistics of Bosnia and Herzegovina, 2006, National accounts 2003- 2006: Sarajevo, Bosnia and Herzegovina, Agency for the Statistics of Bosnia and Herzegovina, December, 85 p.

Federal Office of Statistics, 2007, Federation of Bosnia and Herzegovina in figures: Sarajevo, Bosnia and Herzegovina, Federal Office of Statistics, 85 p.

Metals Insider, 2006a, Bosnian alumina producer targets expansion into primary sector: London, United Kingdom, Sucden (UK) Ltd., July 7, p. 6.

Metals Insider, 2006b, Bosnian smelter announces upgrade and expansion: London, United Kingdom, Sucden (UK) Ltd., June 28, p. 7.

Metals Insider, 2006c, Glencore funding for Bosnian smelter upgrade: London, United Kingdom, Sucden (UK) Ltd., October 3, p. 7.

Petroleum Economist, 2006, Bosnia Herzegovina: London, United Kingdom, Petroleum Economist, v. 73, no. 2, p. 40.

Republika Srpska Institute of Statistics, 2007, National accounts statistical release: Banje Luka, Bosnia and Herzegovina, no. XIII, December 18, 3 p.

Reuters, 2007, Mittal's plant plans 20 pct rise in output: London, United Kingdom, Reuters press release, January 17, 1 p.

CROATIA

Petroleum extraction and refining remained the main sector of Croatia's mineral industry. Most of Croatia's output of industrial minerals was consumed in the domestic market. The country remained heavily reliant on imports of metals for its industrial needs.

Minerals in the National Economy

In 2006, Croatia's gross domestic product (GDP) based on constant prices increased by about 4.8% compared with that of 2005. Industrial production rose by 4.5% compared with that of 2005; the output of the mining and quarrying sector increased by about 10.3%. The production (value) of natural gas and petroleum and industrial minerals increased by 7.6% and 17.6%, respectively, compared with that of 2005. In 2006, Croatia's imports of mineral products, petrochemicals, and base metals constituted about 36% of the value of total imports, which was an increase of about 3% compared with imports from these categories in 2005 (Central Bureau of Statistics of the Republic of Croatia, 2007, p. 207, 299, 383-388).

Production

In 2006, Croatia's metals sector reported mixed production results. The production of secondary aluminum declined by almost 60% compared with that of 2005; crude steel production increased by more than 9%. Major industrial minerals used in construction, such as cement and sand and gravel, reported production increases of 4.4% and more than 218%, respectively. Similarly, production increases were reported for ceramic clay (52%), lime (8%), crude silica products (6.8%), and crushed stone (17%) (table 5).

In 2006, Croatia also reported mixed output results for domestic fossil fuels; natural gas output rose by almost 19%, but that of petroleum declined by about 3% (table 5).

Structure of the Mineral Industry

Table 6 presents information on important Croatian mineral facilities.

Commodity Review

Mineral Fuels

INA-Industrija Nafte d.d. Zagreb (INA), which was Croatia's state-owned natural gas and petroleum exploration and production company, reported total investments in exploration and development in 2006 of about $223 million. Of the

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total 2006 expenditure for exploration and development, $14.1 million, or about 21% of the investment outlay, was earmarked for INA's domestic exploration, which centered on work in the North Adriatic area in a joint-venture project (called EDINA) with Edison (S.p.A.) of Italy. EDINA worked on the area's Izabela Block where a gas reservoir was discovered during the drilling of the Irena-1 exploration well. Another consortium made up of ENI S.p.A. of Italy's subsidiary Agip (INAgip) and INA, discovered two new gasfields in the Adriatic during drilling of two exploratory wells (Ana-1 and Vesna-2) in the Ivana Block. Onshore exploration in the Pannonian Basin involved geophysical surveys in a 167-square-kilometer (km^2) area in the Medimurje-Peklenica region. Exploration also was conducted in the Zalata prospect area in the Drava Basin on the border of Croatia and Hungary. Preliminary results indicated the presence of hydrocarbons; complete analysis, however, was anticipated for early 2007. In September, INA and MOL Hungarian Oil and Gas Plc (MOL) concluded an agreement for joint exploration for hydrocarbons at Zalata, Hungary, and Podravska Slatina, Croatia. Croatia's total domestic and foreign (Angola, Egypt, Namibia, and Syria) exploration work for 2006 yielded INA recoverable fossil fuel reserves that amounted to more than 25 million barrels of oil equivalent (INA-Industrija Nafte d.d. Zagreb, 2007, p. 35-37).

Major development activities in the natural gas sector included the operational startup of the Ika and the Ida gasfields in the Adriatic Sea, the gas pipeline connection of the Ivana-K production platform and the Pula onshore terminal, and the startup of production operations at three gas wells in the Katarina gasfield (INA-Industrija Nafte d.d. Zagreb, 2007, p. 38).

Outlook

Major consumption increases of industrial minerals used in the construction sector are anticipated during the reconstruction, expansion, and modernization of Croatia's infrastructure. The expected development and redevelopment is associated with such major commercial transportation hubs as Croatia's Adriatic Sea ports and transport facilities that radiate from these ports to major commercial centers within and outside the country (International Bank for Reconstruction and Development, 2006, p. 1-7).

The extraction and processing of hydrocarbons are expected to remain the principal elements of Croatia's mineral industry. Steel and industrial minerals designated for construction, however, may see increases of production in the future as infrastructure development begins to increase. The International Bank for Reconstruction and Development (World Bank Group) and several other international financial institutions chose Croatia as a priority market in southern Europe for investment in infrastructure (International Bank for Reconstruction and Development and International Finance Corporation, 2004).

References Cited

Central Bureau of Statistics of the Republic of Croatia, 2007, Statistical Yearbook: Zagreb, Croatia, Central Bureau of Statistics of the Republic of Croatia, December, 802 p.

INA-Industrija Nafte d.d. Zagreb, 2007, INA annual report 2006: Zagreb, Croatia, INA-Industrija Nafte d.d. Zagreb, 182 p.

International Bank for Reconstruction and Development, 2006, Croatia—Trade and transportation project, project appraisal document: Washington DC, International Bank for Reconstruction and Development report no. R 206-0189/1, October 26, 95 p.

International Bank for Reconstruction and Development and International Finance Corporation, 2004, Country assistance strategy for the Republic of Croatia: Washington, DC, World Bank report No. 30717-HR, Annex A6, p. 4.

MACEDONIA

The mineral industry of Macedonia continued to show recovery in 2006. Macedonia's installed production capacities included those for the mining and processing of metals (mainly nonferrous) and for a variety of industrial minerals; mineral fuels were limited to the production of lignite. Crude petroleum was imported and processed at the country's sole domestic refinery. In 2006, the production of lead-zinc ores was resumed; the output of these commodities had ceased in 2003 owing to financial concerns and labor disputes. Environmental issues also contributed to production stoppages and closures (table 7; Metal Bulletin, 2003).

Minerals in the National Economy

The country's gross domestic product (GDP) in 2006 increased by about 3.7% compared with that of 2005; industrial production accounted for about 17% of the GDP. Industrial production rose by about 3.6% compared with that of 2005. Mining and quarrying and manufacturing reported production volume increases of 11.5% and 3.6%, respectively. The mineral industry, which comprised mining and quarrying (metals, industrial minerals, and mineral fuels), the output of base metals, and the production of construction materials, constituted about 33% of the total value of industrial production (Republic of Macedonia State Statistical Office, 2007a, b). Macedonia's summary foreign trade data for 2006 indicated that imports of crude material (including ores and concentrates) and mineral fuels constituted about 24% of total imports, of which mineral fuels constituted more than 20%. Exports in this category amounted to 14.1% of total exports; mineral fuels accounted for more than 9% (Republic of Macedonia State Statistical Office, 2007a, b). The total value of exports in 2006 increased by about 16% compared with that of 2005. This increase in the value of exports was accounted for mainly by increases in the export values of such metals as copper, iron and steel, and nickel and petroleum derivatives, which followed global price increases for these commodities in 2006. Among metals, steel exports' contribution to the increase of total exports in 2006 amounted to 39%; steel exports accounted for about 28% of the total value of exports. Exports by petroleum derivatives and metal ores amounted to about 8% and 3% of the total value of exports, respectively. Factors that affected the increase in the value of Macedonia's exports had the same effect on total imports, which increased in value (euro basis) by almost 15%. The increased market values of energy products and steel in 2006 accounted for more than 27% and 16%, respectively, of this increase (National Bank of Macedonia, 2007).

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Production

In 2006, Macedonia's production of metals generally showed increases. Following a hiatus of production during the 2004-05 period, Macedonia resumed the production of lead and zinc ore and concentrate.

Structure of the Mineral Industry

Table 8 presents information on Macedonia's major mineral facilities.

Commodity Review

Metals

Copper and Gold.—The gross weight production of copper ore increased by 63% compared with that of 2005; the production of recoverable copper in concentrate increased by 54% during the same period (table 7).

Exploration activity during the year included plans by Sirius Exploration plc of the United Kingdom to undertake further exploration and the evaluation of the Kadiica and the Osogovo copper porphyry deposits in northeastern Macedonia. Sirius was to undertake the work under the auspices of a joint-venture agreement with Phelps Dodge Corp. of the United States. Preliminary analysis showed the gold values at Kadiica to range from 0.8 gram per metric ton (g/t) to 7.2 g/t (Mining Journal, 2005; Sirius Exploration plc, 2006).

Iron and Steel and Nickel.—Activity in the ferrous metals sector showed an increase of about 2% for steel output compared with that of 2005 (table 7). In 2006, Macedonia's imports of steel products amounted to almost $300 million; exports amounted to about $202 million. The production of ferronickel (gross weight) increased by about 45% compared with that of 2005; the output of nickel in ferronickel increased by about 35%. Imports of nickel ores and concentrates amounted to about $38 million; exports of ferronickel amounted to more than $202 million (table 7; Republic of Macedonia State Statistical Office, 2007c).

Industrial Minerals

Macedonia continued to produce bentonite, cement, feldspar, gypsum, sand and gravel, stone (carbonate and silicate), and other construction materials mainly for export. The value of output for these commodities in 2006 increased by about 22% compared with that of 2005. In 2006, Macedonia's domestic consumption of cement (Portland) rose by 28%; the consumption of sand and gravel declined by 8% and 65%, respectively (Republic of Macedonia State Statistical Office, 2007d).

Mineral Fuels

Lignite mining and petroleum refining were the only industries in Macedonia's mineral fuels sector. Lignite production in 2006 declined by about 3% compared with that of 2005. Domestic mining supplied about 70% of the fuel for the Bitola coal-fired electric power station, which supplied more than 70% of the country's electricity needs. It has been reported, however, that lignite resources could be exhausted by 2010 at the present rate of production (National Bank of Macedonia, 2007, p. 71-72).

In 2006, Canadian and Kazakh companies expressed interest in exploring for petroleum resources in Macedonia at the Engilija field near Sveti Nikole. Bankers Petroleum Ltd. of Calgary, Alberta, Canada, which had working experience in nearby Albania, signed a cooperative agreement in May for exploration in the area (Alexander's Gas & Oil Connections, 2006).

Outlook

Despite the moribund status of nonferrous metals production in 2005, the production of copper, lead-zinc, and associated metals is expected to resume and grow in volume owing not only to the availability of these minerals but also to the gradual progress in environmental remediation and to increasing regional stability and investor confidence. Foreign direct investment (FDI) in the country's mining and quarrying sector in 2005 (the latest year for which data were available) amounted to more than $20.5 million, which was more than three times greater than FDI in 2004.

References Cited

Alexander's Gas & Oil Connections, 2006, International oil companies interested in Macedonia's untapped oil riches: Limbach, Germany, Alexander's Gas & Oil Connections, v. 11, no. 21, November 9, 1 p.

Metal Bulletin, 2003, No end seen to Macedonian stand-off: Metal Bulletin, no. 8802, September 1, p. 5.

Mining Journal, 2005, Macedonian copper explorer to list: Mining Journal, July 15, p. 12.

National Bank of Macedonia, 2007, Annual report 2006: Skopje, Macedonia, National Bank of Macedonia, April, 132 p.

Republic of Macedonia State Statistical Office, 2007a, External trade scope of the Republic of Macedonia, December 2006: Skopje, Macedonia, Republic of Macedonia State Statistical Office report No. 7.1.7.02, February 6, 8 p.

Republic of Macedonia State Statistical Office, 2007b, Production volume indices December 2006: Skopje, Macedonia, Republic of Macedonia State Statistical Office No. 6.1.7.01, January 29, 8 p.

Republic of Macedonia State Statistical Office, 2007c, Production volume indeces January 2007: Skopje, Macedonia, Republic of Macedonia State Statistical Office report No. 6.1.7.09, January 29, 8 p.

Republic of Macedonia State Statistical Office, 2007d, Quantity and value of building and power materials used by the construction industry in 2006: Skopje, Macedonia, Republic of Macedonia State Statistical Office report No. 6.1.7.43, February 6, 8 p.

Sirius Exploration plc, 2006, Sirius Exploration identifies new gold within its Kadiica copper project area: London, United Kingdom, Sirius Exploration plc press release, November 30, 2 p.

MONTENEGRO

In 2006, Montenegro formally seceded from Serbia and Montenegro, which was the remnant of what was formerly known as Yugoslavia. Montenegro's mineral industry included facilities for the mining and processing of bauxite, dimension stone (calcareous and quartzite), and sand and gravel. Metal production included alumina refining for primary aluminum smelting and steel output; mineral fuels production was limited to lignite (table 9).

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The latest available data (2005) recorded the contribution of the mining and quarrying sector to the gross domestic product (GDP) at about 1.5%. In 2006, the total value of the output of the mining and quarrying sector increased by about 2.9% compared with that of 2005; the value of lignite output rose by 17.5%; that of metal ores (bauxite) and industrial minerals declined by 1.9% and 13.7%, respectively (Montenegro Statistical Office, 2007, p. 71, 117). In terms of volume, the production of bauxite declined by 2% compared with that of 2005. The output of alumina, aluminum, and steel increased by about 1%, 4%, and 78%, respectively, compared with that of 2005. The volume output of lignite increased by about 17% (table 9). In 2006, total investment in Montenegro's economy amounted to euro (€) 475 million (about $627 million), which was an increase of about 43% compared with that in 2006. The share of investment in the country's mineral industry (mining and processing of coal, industrial minerals, and metals) amounted to about 22% of total investment in 2006 (Montenegro Statistical Office, 2007, p. 77).

Outlook

Aluminum output will remain Montenegro's major commercial mineral export asset. Montenegro's mineral industry will serve primarily domestic economic needs.

Reference Cited

Montenegro Statistical Office, 2007, Statistical yearbook of Montenegro 2007: Podgorica, Montenegro, Montenegro Statistical Office, December, 345 p.

SERBIA

Serbia was a modest producer of bauxite, copper, and lead and zinc ores, and such industrial minerals as clays, feldspar, gypsum, magnesite, pumice, and salt. The output of mineral fuels included coal, natural gas, and petroleum.

Minerals in the National Economy

Despite internal continuing tensions arising from efforts of Serbia's Kosovo Province to gain independent nation status, in 2006, Serbia reported economic progress. Serbia reported that its gross domestic product (GDP) in constant prices grew by 5.7% compared with that of 2005. The overall value of mining and quarrying increased by 4.9% compared with that of 2006.

Production

In 2006, the value of output of fossil-based energy carriers (coal, natural gas, peat, and petroleum) increased by 4%. The value of nonenergy-related mine output increased by more than 112% (Republichki Zavod za Statistiku Srbije, 2007, p. 126-129). In 2006, the export volumes of coal and metal ores declined by about 19% and 27%, respectively, compared with those of 2005. The export value of metal ores increased by about 29% compared with 2005 (Republichki Zavod za Statistiku Srbije, 2007, p. 126-129).

Structure of the Mineral Industry

The Government continued to reduce restrictions on foreign investment in the country's mineral industry. In 2006, foreign investment in the country's mineral industry encompassed such targets as the Rudarsko Topionicki Bazen Bor (RTB Bor) (a copper mining and processing complex in Serbia) and magnesite and nickel interests in Serbia's Kosovo Province. Table 11 presents information on Serbia's significant mineral facilities.

Commodity Review

Metals

Aluminum.—After the dissolution of Serbia and Montenegro, Serbia's production of aluminum was limited to secondary metal, which in 2006 increased by 272% to 1,219 metric tons (t) (table 10). In 2006, Serbia's imports of nonalloyed aluminum amounted to 43,476 t; exports of aluminum and aluminum products amounted to 54,209 t (Republichki Zavod za Statistiku Srbije, 2007, p. 289, 293).

Copper.—In 2006, Serbia's production of copper ore declined by about 4% compared with that of 2005. Imports of copper concentrates amounted to 125,665 t, which was an increase of 9% compared with that of 2005 (Republichki Zavod za Statistiku Srbije, 2007, p. 289, 293). The output of total primary and secondary refined copper increased by more than 32%; primary refined copper metal alone increased by about 52% during this period (table 10).

In midyear, the Government of Serbia announced plans to privatize RTB Bor, which was the country's major production complex for copper ores, concentrates, and smelted and refined copper metal. The plan called for an initial sale of 82% of Bor's shares of stock. Earlier in the year, representatives of Antofagasta Holdings plc of Chile and East Point Holdings of Cyprus had expressed interest in acquiring RTB Bor's assets (Metals Insider, 2006, p. 7).

The mining and processing operations at RTB Bor were considered one of the major regional point sources of environmental pollution (airborne and those entrained into aquifers) that required remedial action prior to the company's privatization. Major pollutants included sulfates of cadmium, copper, iron, lead, and zinc. Additionally, a concrete culvert/collector beneath the flotation tailings site, which was in a state of deterioration, required rapid intervention. In 2005, the International Bank for Reconstruction and Development (World Bank Group) approved a loan valued at about $30 million for upgrading the RTB Bor complex, especially those facilities that were largely responsible for the environmental pollution. About $15 million was to be allocated for the reclamation of aquifers and lands adjacent to the RTB Bor complex (Tanjug, 2005; Peck and Zinke, 2006, p. 35-37, 40). In 2006, the World Bank Group's International Development Association provided grants to the Government of Serbia for improving the economy of the Bor region. The Government of Serbia indicated that part of the grant's funds would be allocated for a remediation study of Bor's tailing ponds not under consideration for privatization (Privatization Agency of the Republic of Serbia, 2006).

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In 2006, Dundee Precious Metals Inc. (DPM) signed exploration and mining concession contracts with the Government of Serbia that covered the Coka Kupjatra, the Coka Kuruga, and the Tilva Njagra concessions, which are located near Crni Vrh and about 10 kilometers northwest of Bor. These concession areas are contiguous and cover an area of about 153 square kilometers. The provisions of the agreement call for a 3-year exploration period for copper-gold deposits with an extension of 2 additional years and mining rights for a 25-year period. DPM agreed to an aggregate 4% smelter and concession royalty and a payment of $4 million. DPM planned to allocate $13.6 million during the first year of exploration work (Dundee Precious Metals Inc., 2006). DPM continued work on 15 previously granted exploration concessions, which are also located in the Bor vicinity (Reuters, 2005). The primary ore type in this region, which is known as the Timoc Magmatic Complex district (part of Carpatho-Balkan Metallogenic Province), consists of porphyry deposits; such other ore types as epithermal deposits were believed to be near exhaustion. The main mineral commodities mined in the Timoc district were copper, gold, and silver; important associated commodities were lead and zinc, molybdenum, and platinum-group metals; the principal ore deposits in this region, apart from Bor, are the Borska Reka, the Majdanpek, and the Veliki Krivelj deposits. Dundee's target sites additionally were believed to contain cadmium, germanium, rhenium, and selenium (Republic of Serbia Ministry of Mining and Energy, 2004, p. 20).

In early 2006, Eurasian Minerals Inc. of Vancouver, British Columbia, Canada, which conducted exploration work near Bor at the Borovo-Donje Nevlje, the Brestovac, the Lece, the Plavkovo, the Stara Planina, and the Zajaca concessions, announced the discovery of gold and gold-copper mineralization at Plavkovo and Stara Planina. Sampling at Stara Planina showed gold ranging from 3.76 parts per million (ppm) to 50.4 ppm and copper ranging from 1.73% to 3.76%. Sampling at Plavkovo revealed gold ranging from 1.12 ppm to 1.41 ppm and copper at an average grade of 0.49% (Eurasian Minerals Inc., 2006a, b). In late 2006, however, Eurasian Minerals signed a letter of intent to sell its Serbian exploration properties to the Reservoir Capital Corp. of Vancouver, British Columbia, Canada (Eurasian Minerals Inc., 2006a, b).

Iron and Steel.—In 2006, Serbia's output of pig iron and steel increased by about 37% and 43%, respectively, compared with that of 2005 owing largely to high global and domestic demand (table 10). The United States Steel Corporation (USS) owned and operated Serbia's Smederevo steel mill (USSB) (table 11).

Lead and Zinc.—A clearer picture of future mine production of lead and zinc awaits the resolution of the final political status of Serbia's lead-and zinc-rich Kosovo Province and definitive exploration results in the Bor region. Rudarsko-Metalursko-Hemijski Kombinat za Olovo I Cink Trepca [Trepca lead-zinc mining, beneficiation, and smelting complex (Trepca)] remained under a United Nations (UN) protectorate status. In 2006, the production of lead-zinc ore increased by more than 6% (table 10).

Industrial Minerals

Serbia and Montenegro produced a broad range of industrial minerals, which included cement, crude magnesite, lime, quartz sand, and sand and gravel. In 2006, the production of such major construction materials as cement and sand and gravel increased by about 13% and 14%, respectively, compared with output levels in 2005.

Mineral Fuels

Coal, Natural Gas, and Petroleum.—In the mineral fuels sector, the total production of coal increased by about 5% compared with that of 2005, which was mainly accounted for by a 5.3% growth in lignite production. The production of natural gas declined by about 12% during this period; the output of petroleum increased slightly (by 1%) (table 10).

Serbia continued to rely on imports of energy raw materials for its economy. In 2006, the value of imports of energy products amounted to about $1.4 billion, which was an increase of about 37% compared with that of 2005; exports were valued at about $647 million, which was about 39% more than in 2005. In 2006, total energy imports exceeded total energy exports by about 111% (Statistical Office of the Republic of Serbia, 2007).

The Russian Federation continued to be Serbia's major supplier of natural gas and petroleum. In 2006, Russia accounted for 100% of Serbia's imports of natural gas (more than 2 billion cubic meters). Russia accounted for about 96% of Serbia's total imports of crude petroleum (2.5 Mt) (Statistical Office of the Republic of Serbia, 2007). At yearend 2006, Serbia and Russia announced plans to build a natural gas pipeline that would carry gas from Russia through Turkey, Bulgaria, Serbia, Croatia, and Slovenia to northern Italy; the pipeline would have a design capacity of 20 million cubic meters per year (Alexander's Gas & Oil Connections, 2006).

The Mineral Industry of the Serbian Province of Kosovo

The Serbian Province of Kosovo became a United Nations (UN) protectorate in 1999 under the provisions of UN Security Council Resolution 1244 following the Kosovo crisis that year. More recently, the UN Interim Administration Mission in Kosovo (UNMIK) was involved in efforts to restore Kosovo's infrastructure, industry, and economy, in general, much of which was damaged or destroyed in the conflict of 1999. To promote the reconstruction and development of Kosovo's mineral sector, UNMIK undertook the drafting of mining legislation and the establishment of an independent commission on mines and minerals. The Province of Kosovo's mineral assets include metals [bauxite, iron ore (nickeliferous), and lead-zinc ore], mineral fuels (lignite), and industrial minerals (aggregates, dimension stone, and magnesite) (International Bank for Reconstruction and Development, 2005, p. 3-7).

Outlook

Serbia is slowly recovering from extreme political and social tension, which pervaded the region in the late 1990s and early

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2000s and disrupted long-established regional markets. The production of all minerals was expected to recover slowly during the next several years owing to such factors as investor reticence stemming from a lack of full regional stability, especially the uncertainty about Kosovo's future status.

References Cited

Alexander's Gas & Oil Connections, 2006, Serbia and Russia to sign gas pipeline construction deal: Limbach, Germany, Alexander's Gas & Oil Connections, v. 11, no. 23, December 8, 1 p.

Dundee Precious Metals Inc., 2006, Serbian government signs exploration and mining concession agreements with DPM: Toronto, Ontario, Canada, Dundee Precious Metals Inc. press release, April 26, 2 p.

Eurasian Minerals Inc., 2006a, Gold and gold-copper zones identified at the Plavkovo property, Serbia: Vancouver British Columbia, Canada, Eurasian Minerals Inc. press release, March 1, 3 p.

Eurasian Minerals Inc., 2006b, Gold-copper mineralization at Stara Planina property, Serbia: Vancouver, British Columbia, Canada, Eurasian Minerals Inc. press release, March 3, 2 p.

International Bank for Reconstruction and Development, 2005, Project appraisal document on a proposed grant in the amount of SDR 1.7 million (USD2.5 million equivalent) to the United Nations Interim Administration Mission in Kosovo for the Benefit of Kosovo for an energy technical assistance project-III: Washington, DC, International Bank for Reconstruction and Development report No. 31430-XK, February 24, 60 p.

Metals Insider, 2006, Serbia to start privatization process for RTB Bor in August: London, United Kingdom, Sucden (UK) Ltd., July 21, 23 p.

Peck, Philip and Zinke, Alexander, 2006, South Eastern European mining—Related risks—Identification and verification of hot spots: Vienna, Austria, United Nations Environmental Programme, August, 58 p.

Privatization Agency of the Republic of Serbia, 2006, Republic of Serbia solicitation of expressions of interest for RTB Bor tailing ponds study: Belgrade, Serbia, Privatization Agency of the Republic of Serbia press release, July 27, 1 p.

Republic of Serbia Ministry of Mining and Energy, 2004, Mining districts of Serbia—District database: Belgrade, Serbia, Republic of Serbia Ministry of Mining and Energy, 23 p.

Republichki Zavod za Statistiku Srbije, 2007, Statistichki godishniak Srbije 2006: Belgrade, Serbia, Republichki Zavod za Statistiku Srbije, October, 456 p.

Reuters, 2005, Serbia grants concessions to Rio Tinto, Dundee: London, United Kingdom, Reuters press release, November 17, 2 p.

Statistical Office of the Republic of Serbia, 2007 External trade of Serbia, December 2006: Belgrade, Serbia, Statistical Office of the Republic of Serbia, no. 177, July 10, 3 p.

Tanjug, 2005, World Bank approves $30 million loan for RTB Bor: Belgrade, Serbia and Montenegro, Tanjug, September 13, 20:33: 46 CET.

SLOVENIA

Slovenia relied mostly on foreign sources of minerals for its economy. Domestic mine production continued to be limited to the extraction of coal, natural gas, petroleum, and a variety of industrial minerals. In 2006, the import value of mine and quarry products amounted to about 2% of the value of total imports. Imports of metal ores and concentrates constituted about 7% of the total value of imports of mine and quarry products; industrial minerals, 14% of that value; and energy-related products, about 79%. In terms of value, imports of mine and quarry products exceeded exports by more than nine times (Statistical Office of the Republic of Slovenia, 2007, p. 387).

Minerals in the National Economy

In 2006, Slovenia's gross domestic product (GDP) increased by about 6% compared with that of 2005. Industrial production constituted more than 21% of Slovenia's GDP; the mining sector's contribution to the GDP amounted to about 0.4%.

Production

The total value of production of mine and quarry products increased by more than 10% compared with that of 2005. The output value of basic metals and industrial minerals increased by about 27% during the same period.

Structure of the Mineral Industry

Slovenia's metallurgical sector included the Kidri Kidričevo evo Talum d.o.o. primary aluminum smelter and the following three steel mills: Slovenske Železarne (SŽ), which was a state-owned holding company that maintained ownership of SŽAcroni Jesenice d.o.o. (Acroni); Store Steel Ltd. (formerly a subsidiary of the Inexa Group of Sweden); and SŽ Metal Ravne d.o.o. (Metal Ravne).

Commodity Review

Metals

Aluminum.—In 2006, Talum's output (by volume) of primary aluminum increased by about 1% compared with that of 2004. In 2006, work at Talum continued on the installation of facilities to produce 75,000 metric tons per year (t/yr) of secondary aluminum. The aim of the project, which was scheduled for completion in 2007, was to maintain output at levels prior to the closure of potline B in 2005. Talum's management had decided to close potline B owing to cost considerations involved in modernizing the potline to meet the European Union's environmental standards. Talum planned to expand the capacity of potline C, the output of which would be mixed with remelted aluminum scrap (Metals Insider, 2006, p. 6; Talum d.d., 2007).

Iron and Steel.—In 2006, Slovenia's total output of crude steel rose by about 7.6% compared with that of 2005; the output of steel semimanufactures increased by about 6.3% (table 12). In 2006, Acroni continued facility modernization that included the installation of a new stainless steel plate production line and a dust abatement unit. These projects, which were completed in September, cost about $29 million (Acroni d.o.o., 2006).

Industrial Minerals

Activity in the country's industrial minerals sector included significant increases in the output of lime, sand and gravel, and crushed stone, which amounted to 37%, 83%, and 17%, respectively, compared with those of 2005 (table 12). Slovenia's production of mineral fuels continued to decline in 2006. The output of brown coal, lignite, natural gas, and petroleum declined by 1.2%, 0.3%, 4.0%, and 4.7%, respectively, compared with output levels attained in 2005 (table 12).

Outlook

During the past decade, Slovenia's economic transition from a central planning model to an open market system has gradually

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diminished the role of the mineral industry, and higher value industries began playing an increasingly greater role in the country's economy. Raw materials needed by Slovenian industry will continue to be imported to an even greater extent.

References Cited

Acroni d.o.o., 2006, Acroni invests into development and ecology; another two heavy investments before sale: Jesenice, Slovenia, Acroni d.o.o. press release, September 16, 2 p.

Metals Insider, 2006, Slovenia smelter to phase out older technology: London, United Kingdom, Sucden (UK) Ltd., February 7, p. 6.

Statistical Office of the Republic of Slovenia, 2007, Statistical yearbook of the Republic of Slovenia: Ljubljana, Slovenia, Statistical Office of the Republic of Slovenia, 600 p.

Talum d.d., 2007, Aluminum scrap re-melting: Kidricevo, Slovenia, Talum d.d. press release, 1 p.

TABLE 1
ALBANIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2002	2003	2004	2005	2006
METALS						
Bauxite[e]		5,000	5,000	--	-- [3]	--
Chromium:						
Chromite, gross weight		215,000 [e]	220,000 [e]	160,300	170,000 [3]	210,120
Marketable ore and concentrate:						
Marketable ore (41.6% Cr_2O_3)		82,000	89,000	40,000	50,000	50,000
Concentrate		9,000	10,000	14,430	16,270	10,000
Total		91,000	99,000	54,430	66,270	60,000
Copper:						
Ore, gross weight		--	--	29,030	73,000	10,000
Concentrate:						
Gross weight		--	--	3,210	8,480	2,000
Cu content[e]		--	--	642	1,696 [3]	400
Iron and steel:						
Metal, ferroalloys, ferrochromium		22,800	37,800	34,650 [r]	34,400 [r]	17,040
Steel:						
Crude steel		96,600	86,117	98,026	87,000 [r]	100,000
Rolled steel		--	--	135,000	100,000 [r]	100,000
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand metric tons	348	578	530	575 [e]	600
Clay, kaolin[e]	do.	350	--	300	310 [3]	300
Dolomite[e]		1,000,000	1,500,000	1,613,000 [3]	1,000,000 [3]	1,000,000
Olivinite[e]		200	200	200	200	200
Salt		22,746	21,448	24,783	25,000 [e]	25,000
MINERAL FUELS AND RELATED MATERIALS						
Asphalt and bitumen, natural[4]		4,200	42,076	61,035	43,000 [r]	45,000
Coal, lignite	thousand metric tons	20,300	18,000	12,600	13,100 [r]	13,000
Gas, natural, gross production[5]	thousand cubic meters	9,150	11,617	11,965	11,347	11,000
Petroleum:						
Coke		40,000	57,541	58,712	47,900	45,000
Crude, gross weight		350,038	359,253	399,740	448,041	400,000

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. -- Zero.

[1]Table includes data available through November 2007.

[2]In addition to the commodities listed, a variety of industrial minerals and construction materials (common clay, quartz, sand and gravel, stone, and titanomagnetite) are produced, but output is not reported quantitatively, and available information is inadequate to make reliable estimates of output.

[3]Reported figure.

[4]Includes asphalt and bitumen produced at petroleum refineries.

[5]Separate data on marketable production are not available, but gross and marketed output are regarded as being nearly equal.

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TABLE 2
ALBANIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1]

(Thousand metric tons unless otherwise specified)

Commodity		Location of main facilities (all state-owned)	Annual capacity
Cement		Elbasan, 32 kilometers southeast of Tirana; Kruje, 20 kilometers northwest of Tirana; Shkoder, 85 kilometers northwest of Tirana; and Vlore, southwest of Tirana	1,200
Chromite		Bater (including Bater I and II and Martanesh), 40 kilometers northwest of Tirana	450
Do.		Bulquize (including Bulquize south, Fush, Terrnove, and Todo Maco), 35 kilometers northwest of Tirana	450
Do.		Kalimash, 60 kilometers north of Tirana	250
Do.		Kam, 70 kilometers north of Tirana	100
Do.		Klos, 20 kilometers northeast of Tirana	50
Do.		Pogradec (including Katjiel, Memelisht, Pojske, Pishkash, and Prrenjas), 50 kilometers east of Tirana	100
Coal, lignite		Maneze, Mezes, and Valias Mines in Tirana Durres area; Krabe Mine, 20 kilometers southeast of Tirana; Alarup and Cervnake Mines, in Pogradec area, 80 kilometers southeast of Tirana; Mborje-Drenove Mine in Korce area, 85 kilometers southwest of Tirana; and Memaliaj Mine in Tepelene area, 110 kilometers south of Tirana	2,500
Copper:			
Ore		Fushe-Arrez, 80 kilometers north of Tirana	350
Do.		Gjejan, 100 kilometers northeast of Tirana	150
Do.		Golaj (including Nikoliq and Pus), 120 kilometers northeast of Tirana	150
Do.		Kurbnesh-Perlat, 55 kilometers northeast of Tirana	100
Do.		Rehove, 110 kilometers southeast of Tirana	100
Do.		Reps (including Gurch, Lajo, Spac, and Thurr), 55 kilometers north of Tirana	350
Do.		Rreshen, 50 kilometers north of Tirana	50
Do.		Shkoder (including Palaj, Karma I and II), 85 kilometers northwest of Tirana	100
Smelter		Kukes, 110 kilometers northeast of Tirana	6
Do.		Lac, 35 kilometers northwest of Tirana	7
Do.		Rubik, 50 kilometers north of Tirana	4
Ferrochromium		Burrel, 35 kilometers northeast of Tirana	40
Do.		Elbasan, 32 kilometers southeast of Tirana	36
Iron ore		Prrenjas (Bushtrica, Prrenjas, Skorska I and II), 70 kilometers southeast of Tirana	650
Do.		Guri i Kuq (including Cervenake, Grasishta, Guri i Kuq, Hudenisht and Guri Pergjrgjur), 25 kilometers east of Tirana	500
Natural gas	million cubic feet	Gasfields on southwest Albania between Ballsh and Fier	16,000
Nickel, smelter		Elbasan	6
Petroleum:			
Crude	42-gallon barrels per day	Oilfields at Marineze, Ballsh, Shqisht, Patos, Kucova, Gorrisht, and others	35,000
Refined	do.	Refineries: Ballsh, Cerrik, Fier, and Stalin	33,000
Steel		Steel of the Party Metallurgical Combine at Elbasan	150

[1]A substantial portion of these enterprises have been operating significantly below capacity during the transition to a market economy; the capacities provided in this table represent only the latest available information and may not show the true status of these enterprises.

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TABLE 3
BOSNIA AND HERZEGOVINA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2002	2003	2004	2005	2006
METALS						
Aluminum:						
Bauxite		71,312	573,000	916,928	1,031,618 r	816,768
Alumina, metallurgical grade		--	35,011	356,844	447,260 r	350,000
Metal, ingot; primary and secondary		102,271	112,503	121,296	131,232	136,190
Iron and steel:						
Ore and concentrate:						
Gross weight		212,114	126,929	280,596	3,176,748 r	3,439,587
Fe content		106,000	63,000	140,300	1,500,000 r	1,700,000
Metal:						
Ferroalloys e		20,000	20,000	19,820 [3]	15,000	20,000
Pig iron e		60,000	60,000	60,000	60,000	60,000
Crude steel		115,222	166,368	117,170	283,111	469,122
Semimanufactures e		150,000	113,000	150,000	150,000	200,000
Lead:						
Concentrate, gross weight		--	--	1,668	1,700	1,700
Metal, smelter, primary and secondary e		100	100	35	50	50
Manganese ore: e						
Gross weight		2,000	2,000	2,000	2,000	2,000
Mn content		500	500	500	500	500
Zinc concentrate, gross weight		--	--	2,135	2,200	2,000
INDUSTRIAL MINERALS						
Asbestos, all kinds e		500	500	500	500	500
Barite concentrate e		80	80	65	160	190 [3]
Cement	thousand metric tons	912,611	890,179	1,044,944	1,025,540 r	1,226,319
Clays:						
Bentonite		13,050	16,967	24,353	24,882 r	24,050
Ceramic clay, crude		4,340	35,861	16,784	14,553 r	15,000
Fire clay, crude		10	--	--	--	--
Kaolin:						
Crude		6,500	50,000	46,000 [3]	45,000	42,422
Calcined		3,000	--	--	--	--
Dolomite, crude		96,584	96,776	223,378	128,639 r	130,000
Gypsum:						
Crude		44,200	63,050	139,520	152,939 r	128,399
Calcined		6,504	6,042	6,000 e	6,000	6,000
Lime		58,316	79,302	146,000	186,000 r	180,000
Magnesite, crude		2,000	2,000	2,000	2,000	2,000
Nitrogen, N content of ammonia		500	500	500	500	500
Quartz, quartzite, glass sand e		50,000	50,000	50,000	119,831 r, [3]	120,000
Salt, all sources		200,000	200,000	260,500	392,240 r	416,305
Sand and gravel, excluding glass sand	thousand cubic meters	362	476	450	574 r	600
Sodium compounds: e						
Soda ash		-- [3]	11,804 [3]	11,000	11,000	11,000
Caustic soda		5,000	5,000	5,000	5,000	5,000
Sodium bicarbonate		500	500	500	500	500
Stone (excluding quartz and quartzite), dimension, crude:						
Ornamental	square meters	35,900	35,800	35,000 e	35,000 e	35,000 e
Crushed and brown, n.e.s.	thousand cubic meters	321	153	150	150	150
Other	cubic meters	11	--	--	--	--
MINERAL FUELS AND RELATED MATERIALS						
Brown coal and lignite	thousand metric tons	7,799	9,006	8,896	9,000	9,965
Petroleum refinery products		291,000	72,000	110,000	110,000	110,000

eEstimated; estimated data are rounded to no more than three significant digits. rRevised. -- Zero.

[1]Table includes data available through November 2007.

[2]In addition to commodities listed, common clay was also produced, but available information is inadequate to make reliable estimates of output.

[3]Reported figure.

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TABLE 4
BOSNIA AND HERZEGOVINA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities	Annual capacity
Alumina		Ukio Banco Investment Group	Plants at Birac-Zvornik	600
Do.		Aluminij d.d. Mostar.	Plant at Mostar	280
Aluminum		do.	Smelter at Mostar	150
Bauxite		Energoinvest	Mines at Vlasenica, Jajce, Bosanska Krupa, Posusje, Listica, Citluk, and other locations	2,000
Cement		Tvornica Cementa Kakanj d.d.	Plant at Kakanj	650
Do.		D.D. Fabrica Cementa Lukavac	Plant in Lukavac	340
Coal:				
Brown		SOUR Titovi Rudnici Uglja, Tuzla	Mines in BiH	12,000
Lignite		do.	do.	7,000
Ferroalloys		Elktrobosna, Elektrohemijska i Eletrotermijska Industrija	Plant at Jajce	80
Iron ore		Mittal Mines	Mines at Ljubija	5,000
Lead-zinc ore		Energoinvest	Mine and mill at Srebrenica	300
Manganese ore		Mangan-Energoinvest	Mine and concentrator at Buzim	100
Petroleum, refined	thousand 42-gallon barrels per day	Energoinvest: Rafinerija Nafte Bosanski Brod	Refinery at Bosanski Brod	100
Pig iron		B-H Steel-Zeljezara Ltd. (Kuwait Consulting and Investment, 50%, and Zeljezara Zenica Ltd., 50%)	Blast furnace at Zenica	2,250
Salt, rock	cubic meters per year	Hemijski Kombinat "Sodaso," Rudnik Soli i Solni Bunari	Mines at Tusanj	120,000
Do.	do.	do.	Production from brine at Tuzla, BiH	2,000,000
Steel, crude		Mittal Steel Zenica (Zenica) (Mittal Steel Company Ltd., 92%)	Plant at Zenica	2,060

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TABLE 5
CROATIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2002	2003	2004	2005	2006
METALS						
Aluminum:						
Metal, ingot, secondary		1,000	1,200	5,500	6,256 r	2,457
Alloys		812	1,180	1,100	1,100 e	350
Semimanufactures, rolled		33,774	38,114	35,000	35,000 e	20,000
Steel:						
Crude, from electric furnaces		33,851	43,380	80,000	73,640 r	80,516
Semimanufactures, hot rolled		--	13,000	50,000	58,000	60,000
INDUSTRIAL MINERALS						
Cement	thousand metric tons	3,378	3,654	3,811	3,481 r	3,633
Clays:						
Bentonite		12,102	13,568	16,000	17,391 r	16,410
Ceramic clay		150,000 e	188,000	637,000 e	197,921 r	300,718
Gypsum:						
Crude		145,000	166,000	148,000	196,133 r	170,351
Calcined[e]		1,200 [3]	1,400	1,200	1,200	1,200
Lime	thousand metric tons	269	251	250	1,988 r	2,155
Nitrogen, N content of ammonia	do.	289	322	404	400	400
Pumice and related materials, volcanic tuff	do.	41	29	23	21 r	17
Salt, all sources		36,885	31,281	23,000	36,970 r	29,589
Sand and gravel, excluding glass sand		15,000 r,e	15,000 r,e	116,000 r,e	114,785 r	365,550
Silica:						
Quartz, quartzite, glass sand		275,121	237,141	128,000	130,888 r	139,730
Glass:						
Flat glass	thousand square meters	390	495	400 e	400 e	400 e
Container glass		148,612	171,070	150,000 e	150,000 e	150,000 e
Other hollow glass		1,711	1,466	1,400 e	1,400 e	1,400 e
Stone, excluding quartz and quartzite, dimension stone, crude:						
Ornamental	square meters	1,127,948	1,093,573	1,000,000 e	1,000,000 e	1,000,000 e
Crushed and brown, n.e.s.	thousand metric tons	14,736	19,022	19,000 e	15,103 r	17,625
Other[e]	cubic meters	25,000	25,000	20,000	20,000	20,000
Sulfur, byproduct of petroleum		7,069	7,471	7,500 e	7,500 e	7,500 e
MINERAL FUELS AND RELATED MATERIALS						
Carbon black		19,386	21,497	21,000 e	20,000 e	20,000 e
Natural gas, gross production	million cubic meters	2,122	2,190	1,851	2,283 r	2,714
Petroleum, crude:						
As reported, includes condensate	thousand metric tons	1,108	1,052	1,155	980 r	951
Refinery products		4,513,338	4,742,012	4,500,000 e	4,000,000 r,e	4,000,000 e

[e]Estimated; estimated data are rounded to no more than three significant digits. [r]Revised. -- Zero.
[1]Table includes data available through November 2007.
[2]In addition to commodities listed, common clay also was produced, but available information is inadequate to make reliable estimates of output.
[3]Reported figure.

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TABLE 6
CROATIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities	Annual capacity
Alumina		Jadral, Jadranski Aluminijum	Jadral Alumina Plant	150
Aluminum		Boris Kidric Tvornica Lakih Metala	Smelter at Sibenik	75
Do.		Top-Tvornica Olovni i Aluminjskikh	Semimanufactures producer at Savska	NA
Cement		Dalmacija Cement	Sv. Jurai plant at Kastel Sucurac	1,300
Do.		do.	Sv. Kajo plant at Solin	750
Do.		do.	Majdan plant at Solin Majdan	780
Do.		Istra Cement International D.D.	Plant at Pula	70
Do.		Tvornica Cementa Koromacno	Plant at Koromacno	420
Do.		Tvornica Cementa Umag D.D.	Cement plant at Umag	480
Do.		Nasicecement D.D.	Nacise plant at Tajnovac	840
Coal, bituminous		Istarski Ugljenokopi Rasa	Mines at Labin and Potpican	500
Natural gas	million cubic feet	INA-Industrija Nafte d.d. Zagreb (INA)	Main natural gasfields at Bogsic Lug and Molve	70,000
Petroleum, crude	thousand 42-gallon barrels per day	do.	Oilfields in Croatia and Slovenia (Benicanci, Zutica, Struzec, Ivanic Grad, Lendava, and other locations)	70
Do.	do.	do.	Refineries at Urinj and Rijeka	160
Do.	do.	do.	Refinery at Sisak	150
Pig iron		Metalurski Kombinat Zeljezara Sisak	2 blast furnaces at Sisak	235
Salt	cubic meters	Solana Pag, Solana Ante Festin	Pag Island (marine salt)	13
Steel, crude		SP MK Zeljezare Sisak d.d.	Plant at Sisak	75
Do.		Jadranska Zelejzara Split	Plant at Split	170

NA Not available.

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TABLE 7
MACEDONIA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES[1, 2]

(Metric tons unless otherwise specified)

Commodity[3]		2002	2003	2004	2005	2006
METALS						
Aluminum, metal, ingot, secondary		4,000	4,000	4,000	4,000	4,000
Cadmium, smelter output	kilograms	111 [4]	75 [4]	--	--	--
Copper, mine and concentrator output:						
Ore, gross weight	thousand metric tons	1,200	1,200	--	2,536 [r, 4]	4,132 [4]
Concentrate:						
Gross weight		15,000	15,000	--	100,000 [r]	170,000
Cu content		5,600	2,567 [4]	--	21,800 [4]	33,591 [4]
Gold	kilograms	500	400	--	750	700
Iron and steel:						
Ferroalloys:						
Ferronickel (38% Ni), gross weight		17,000 [4]	15,000	14,000	20,000 [r]	29,000 [4]
Ferrosilicon		60,000	50,000	56,000	71,249 [r, 4]	59,023 [4]
Total		77,000	65,000	70,000	91,249 [r, 4]	88,023 [4]
Steel, crude		224,601 [4]	291,354 [4]	315,000 [4]	321,170 [r, 4]	326,484 [4]
Semimanufactures		261,886 [4]	305,111 [4]	637,000 [4]	650,000 [4]	650,000
Lead:						
Mine output, concentrate, Pb content		15,000 [4]	5,000 [4]	-- [4]	-- [4]	15,600 [4]
Primary and secondary:						
Smelter		3,500	3,500	-- [4]	-- [4]	-- [4]
Refined		19,800	8,000 [4]	-- [4]	-- [4]	-- [4]
Nickel, metal, Ni content of FeNi		5,149 [4]	5,629 [4]	5,300 [4]	8,100 [4]	10,900 [4]
Silver	kilograms	12,000	10,000	--	--	--
Zinc:						
Concentrate, Zn content		10,000	4,000 [4]	-- [4]	--	21,700 [4]
Metal, refined, primary and secondary		38,000	15,100 [4]	-- [4]	--	--
INDUSTRIAL MINERALS						
Cement	thousand metric tons	600	768 [4]	820 [4]	800	800
Clays, bentonite		25,000	25,000	25,000	25,000	25,000
Diatomite		5,000	5,000	5,000	5,000	5,000
Feldspar		21,000	21,000	21,000	27,076 [r, 4]	38,124 [4]
Gypsum, crude		150,000 [r]	150,000 [r]	150,000 [r]	190,232 [r, 4]	267,760 [4]
Lime		500	500	500	500	500
Pumice and related materials, volcanic tuff		50,000	50,000	50,000	50,000	50,000
Sand and gravel, excluding glass sand	thousand cubic meters	100	100	100	100	100
Stone, excluding quartz and quartzite:						
Dimension, crude	square meters	150,000	150,000	150,000	150,000	150,000
Ornamental	thousand cubic meters	300	300	300	300	300
Crushed and broken, n.e.s.[5]	cubic meters	5,000	5,000	5,000	5,000	5,000
Other	thousand metric tons	25,000	25,000	25,000	25,000	25,000
Talc, washed		550	550	550	1,955 [r, 4]	1,025 [4]
MINERAL FUELS AND RELATED MATERIALS						
Lignite	thousand metric tons	8,640 [4]	8,360 [4]	8,500 [4]	6,880 [r, 4]	6,650 [4]
Petroleum, refinery products	thousand 42-gallon barrels	6,000	6,000	6,200	7,000	7,000

[1]Estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. -- Zero.
[2]Table includes data available through November 2007.
[3]In addition to commodities listed, common clay also is produced, but available information is inadequate to make reliable estimates of output.
[4]Reported figure.
[5]Not elsewhere specified.

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TABLE 8
MACEDONIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity[e]
Cement	Azbestcementa "Usje" Preduzece za Proizvodnju Cementa	Plant at Skopje	2,190
Chromite, concentrate	Jugohrom, Hemijsko-Elektrometakurski Kombinat (HEK)	Concentrator at Radusa	150
Copper ore	Bucim, Rabotna Organizacija za Rudarstvo i Metalurgija za Baker	Mine and mill at Bucim, near Radovis	4,000
Ferroalloys	Jugohrom, Hemijsko-Elektrometalurski Kombinat (HEK)-Jegunovce	Plant at Jegunovce	80
Iron ore	Skopje, Rudnici i Zeljezarnica Skopje	Mines at Tajmiste, Demir Hisar, and Damjan	1,000
Lead metal	Zletovo, Topilnica za Cink i Olovo	Imperial smelter at Titov Veles	40
Do.	do.	Refinery at Titov Veles	40
Lead-zinc, concentrate	Sasa–Makedonska Kamenica Mine (Sase, Rudnici za Olovo i Cink)	Mill near Kamenica	65
Lead-zinc ore	Prepobotuvacki, Kombinat Zletovo-Sasa: Sase, Rudnici za Olovo i Cink	Mine near Kamenica	300
Do.	Zletovo, Rudnici za Olovo i Cink	Mine and mill near Probistip	700
Nickel:[1]			
Ore	Feni Industries	Mine and opencast mine near Kavadarci	2,300
Metal	do.	Ferronickel plant at Kavadarci	7
Steel, crude	Makstil A.D. Skopje (Duferco Group, 54.4%)	Plant at Skopje	260
Zinc metal	Zletovo, Topilnica za Cink i Olovo	Imperial Smelter plant and refinery at Titov Veles	65

[1]Nickel in ferronickel.

TABLE 9
MONTENEGRO: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2002	2003	2004	2005	2006
METALS						
Aluminum, gross weight:						
Alumina, calcined		237,396	239,739	245,005	235,196 r	236,740
Bauxite		611,500	540,051	610,000	672,345 r	659,370
Metal, ingot, primary		111,689	116,744	115,080	116,995 r	121,762
Iron and steel, metal, crude steel		17,458	6,438	29,809	28,115	49,978
INDUSTRIAL MINERALS						
Lime	thousand metric tons	11,123	8,136	10,591 r	6,008	8,118
Salt (sea water evaporate)		--	32,500	20,000	15,000	5,000
Sand and gravel, excluding glass sand	cubic meters	135	352	--	--	--
Stone, excluding quartz and quartzite, dimension, crude:						
Ornamental (marble blocks)	square meters	36,349	29,844	12,321	21,404	43,057
Crushed and broken, n.e.s.	cubic meters	72,523	49,981	41,936	92,506	90,000
Other, stone products	do.	29,433	40,399	33,919	26,149	25,000
MINERAL FUELS AND RELATED MATERIALS						
Coal, lignite		1,751,000	1,618,000	1,514,000	1,288,016	1,502,334

rRevised. -- Zero.

[1]Table includes data available through November 2007.

[2]In addition to commodities listed, common clay and diatomite also are produced, and tellurium may be recovered as a copper refinery byproduct, but available information is inadequate to make reliable estimates of output.

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TABLE 10
SERBIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2002	2003	2004	2005	2006[e]
METALS						
Aluminum ingot, secondary		300 [e]	300 [e]	300 [e]	328	1,219 [3]
Copper:						
Mine and concentrator output:						
Ore:						
Gross weight	thousand metric tons	7,968	5,714	5,495	6,005	5,775 [3]
Cu content		38,000	28,000	25,000	27,000	28,000
Concentrate:						
Gross weight		185,000 [e]	102,000	95,000	97,000	93,000
Cu content		36,900	26,400	24,000	26,100	25,100 [3]
Metal:						
Blister and anodes:						
Primary		36,000	14,000	12,000	16,300	15,400
Remelted		6,700 [e]	3,600	1,100	6,000	5,000
Total		42,700	17,600	13,100	22,300	20,400 [3]
Refined:						
Primary		26,897	9,000	12,000	25,300 [r]	35,400
Remelted		9,000 [e]	5,029	7,000	6,000	6,000
Total		35,897	14,029	19,000	31,300 [r]	41,400 [3]
Gold, refined	kilograms	858	363	400	400	400
Iron and steel, metal:						
Pig iron		485,000	635,481 [r]	959,019 [r]	1,115,195 [r]	1,529,177 [3]
Crude steel		596,000	569,199	1,167,000	1,286,000	1,837,000 [3]
Semimanufactures		877,000	947,191 [r]	1,543,453 [r]	1,890,330 [r]	2,379,918 [3]
Lead:						
Ore:						
Gross weight (Pb-Zn ore)		284,000	183,000	180,000	162,000 [r]	172,000 [3]
Pb content[e]		3,100	2,000	2,000	1,600 [r]	1,900
Metal, primary and secondary, refined		200	500	800	700 [r]	700
Magnesium, metal[e]		1,800	1,500	1,500	1,500	1,500
Platinum-group metals:[e]						
Palladium	kilograms	10	8	8	8	8
Platinum	do.	1	1	1	1	1
Selenium[e]	do.	15,000	7,000 [3]	7,000	7,000	7,000
Silver, mine output, Ag content	do.	6,838	2,028	2,000 [e]	2,000 [e]	2,000 [e]
Zinc:						
Concentrator output, gross weight[e]		20,300	6,500	3,800 [r]	2,600 [r]	6,200
Zn content of concentrate[e]		6,900	2,200 [r]	1,300 [r]	900 [r]	2,100 [3]
Refined		1,478	62	4,000	6,000	4,000
INDUSTRIAL MINERALS						
Asbestos fiber, all grades		372	111	110 [e]	143 [r]	157
Cement	thousand metric tons	2,396	2,075	2,240	2,276 [r]	2,565 [3]
Clays:						
Ceramic clay[e]		30,000	25,000	25,000	25,000	30,000
Fire clay:[e]						
Crude		30,000	30,000	30,000	30,000	40,000
Calcined		10,000	10,000	10,000	10,000	10,000
Kaolin, crude		95,622	99,460	95,000 [e]	95,000 [e]	110,000
Feldspar, crude		7,813	3,045	3,500 [e]	3,500 [e]	3,500
Gypsum, crude		54,937	42,261	45,000 [e]	45,000 [e]	45,000
Lime	thousand metric tons	468	402	400	400	400
Magnesite:						
Crude	do.	33	24	20	20	20
Caustic calcined[e]		2,500	2,000	1,500	1,500	1,500
Mica, all grades		426	185	200	200	200
Nitrogren, N content of ammonia		65,000 [e]	60,000	138,000 [r]	111,000 [r]	80,000
Pumice and related volcanic materials, volcanic tuff[e]		100,000	100,000	100,000	100,000	100,000
Salt, all sources		42,243	78,271	75,000	75,000	75,000
Sand and gravel, excluding glass sand	thousand cubic meters	2,074	1,507	1,500	7,556 [r]	8,633 [3]

See footnotes at end of table.

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TABLE 10—Continued
SERBIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2002	2003	2004	2005	2006[e]
INDUSTRIAL MINERALS—Continued						
Silica:						
Quartz sand		258,801	260,880	260,000	260,000	260,000
Glass		104,000	65,000	80,000	80,000	80,000
Sodium compounds:						
Caustic soda		6,787	7,450	7,000 [e]	7,000 [e]	7,000
Sodium sulfate[e]		800	800	800	800	800
Stone, excluding quartz and quartzite, dimension, crude:						
Ornamental	square meters	103,000	69,000	70,000	70,000	70,000
Crushed and broken, n.e.s.[e]	thousand cubic meters	3,000	2,000	2,000	2,000	2,000
Other, stone blocks[e]	cubic meters	1,000	500	500	500	500
Sulfur, byproduct:[e]						
Metallurgy	thousand metric tons	75	40	50	50	50
Petroleum	do.	1	1	1	1	1
Total	do.	76	41	51	51	51
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Bituminous	thousand metric tons	70	54	50	65 [r]	65 [3]
Brown	do.	423	397	352	363 [r]	316 [3]
Lignite	do.	32,995	34,543	35,192	34,565 [r]	36,404 [3]
Total	do.	33,488	34,994	35,594	34,993 [r]	36,785 [3]
Natural gas, gross production	million cubic meters	400	364	317	320	280 [3]
Petroleum:						
Crude, as reported	thousand metric tons	682	671	652	648 [r]	654 [3]
Refinery products	do.	2,369	2,380	2,300 [e]	2,300 [e]	2,300

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised.
[1]Table includes data available through November 2007.
[2]In addition to commodities listed, common clay and diatomite also are produced, and tellurium may be recovered as a copper refinery byproduct, but available information is inadequate to make reliable estimates of output.
[3]Reported figure.

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TABLE 11
SERBIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities	Annual capacity
Antimony, ores and concentrates		Zajaca, Rudarsko Tapionicarski Bazen	Mines and mills near Zajaca, Serbia	80.
Do.		do.	Mines and mill at Rajiceva Gora, Serbia	300.
Antimony, metal		do.	Smelter at Zajaca, Serbia	4.
Cement		Becinska Fabrika Cementa	Plant at Beocin, Serbia	2,031.
Do.		Fabrika Cementa Novi Popovac	Plant at Popovac, Serbia	1,613.
Coal:				
Bituminous		Ibarski Rudnici Kamenog Uglja	Mines at Jarando and Usce, near Baljevac na Ibru, Serbia	250.
Lignite		SOUR Kolubara, Rudarsko Energetsko Industrijski Kombinat, RO	Opencast mines: Polje B and Polje D	10,000.
Do.		Kolubara Povrsinski Kopovi	Tamnavski Kopovi (also known as Kolubarski Rudnici Lignita), near Vreoci, Serbia	14,000.
Do.		SOUR Elektroprivreda Kosova, RO Kosovo, Proizvodnja Separacija i Transport Uglja	Opencast mines: Dobro Selo and Belacevac, near Obilic, Serbia	2,000.
Copper		Rudarsko Topionicki Bazen Bor (RTB Bor)	Smelter at Bor, Serbia	180.
Do.		do.	Electrolytic refinery at Bor, Serbia	180.
Do.		do.	Mine and mill at Bor, Serbia	5,000 ore.
Do.		do.	Mine and mill at Majdanpek, Serbia	15,000 ore.
Do.		do.	Mine and mill at Veliki Krivelj, Serbia	8,000 ore.
Lead, metal		Rudarsko-Metalursko-Hemijski Kombinat za Olovo i Cink Trepca (Trepca)	Smelter at Zvecan, Serbia	180.
Do.		do.	Refinery at Zvecan, Serbia	90.
Lead-zinc ore		do.	Mines at Ajvalija, Kopanaonik, Badovac; Trepca, Blagodat, Lece; Veliki Majdan, Tisovak; and Kisnica, Rudnik, Suplja Stijena	5,000.
Do.		do.	Mills at Kriva Feja, Lece, Rudnik, Badovac, Leposavic, Zvecan, and Maravce, Suplja Stijena	3,160.
Do.		Veliki Majdan Rudnik Olova i Cinka	Mine at mill near Krupanj, Serbia	250.
Magnesite, concentrate		Rudnici Magnezita "Sumadija"	Mine and plant at Sumadija, 20 kilometers northwest of Cacak, Serbia	120.
Do.		Rudnik i Industrija Magnezita "Strezovce"	Opencast mine at Beli Kamen, Strezovce, near Itiova Metrovica, Serbia	300.
Do.		do.	Sinter plant at Strezovce	40.
Do.		Magnohrom, Rudnik Magnezita "Magnezit"	Mine at Bela Stena, Baljevac na Ibru, Serbia	30.
Natural gas	million cubic feet	Naftaplin (Naftagas), RO za Istrazivanje, i Prozvodnju Nafte i Gasa	Natural gasfields in Serbia: Kinkinda and others	30,000.
Petroleum:				
Crude	thousand 42-gallon barrels per day	Naftagas, Naftna Industrija	Oilfields in Serbia: Kikinda and others	30.
Refined	do.	Naftagas, Naftna Industrija: Rafinerija Nafte Pancevo	Refinery at Pancevo, Serbia	110.
Do.	do.	Rafinerija Nafte Novi Sad	Refinery at Novi Sad, Serbia	28.
Pig iron		U.S. Steel Serbia	Blast furnace at Smederevo, Serbia	720.
Steel, crude		do.	Plant at Smederevo, Serbia	2,200.
Zinc, metal		Rudarsko Metalursko Hemijski Kombinat Olova i Cinka Trepca, Metalurgija Cinka	Electrolytic plant at Titova Metrovica, Serbia	40.
Do.		Hemijska Industrija Zorka	Electrolytic plant at Sabac, Serbia	40.

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TABLE 12
SLOVENIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2002	2003	2004	2005	2006
METALS						
Aluminum, ingot, primary		87,600	109,800	120,666	138,500	139,600
Iron and steel, metal:						
Ferroalloys:						
Ferrosilicocalcium[e]		100	--	--	--	--
Ferrosilicon[e]		9,000	9,000	9,000	9,000	9,000
Crude steel from electric furnaces		481,000	541,000 r	566,000 r	583,000 r	627,000
Semimanufactures		400,000	594,000	621,000	638,939	678,854
Lead, refined, secondary		15,400	15,400	16,000	15,400	15,400
INDUSTRIAL MINERALS						
Cement[e]	thousand metric tons	1,250	1,300	1,300	1,500 r	1,500
Clays:						
Bentonite[e]		4,122 [3]	4,000	1,000 r	140 r	130
Ceramic clay, crude		2,000 e	2,261	1,819	1,800 e	1,800 e
Lime	thousand metric tons	1,636,000 r	1,500,000 r,e	1,500,000 r,e	1,840,287 r	2,522,793
Pumice and related materials, volcanic tuff[e]		40,000	40,000	40,000	40,000	40,000
Quartz, quartzite, glass sand[e]		200,000	200,000	200,000	200,000	200,000
Salt, all sources		128,212	125,000 e	1,000 r,e	803 r	1,624
Sand and gravel, excluding glass sand		5,000,000 r	5,000,000 r,e	5,000,000 r,e	3,750,707 r	6,871,519
Stone, excluding quartz and quartzite, crude:						
Dimension		6,858	12,603	10,667	15,262	15,000 e
Crushed stone		10,000,000 r	10,000,000 r	10,000,000 r	12,176,491 r	14,213,319
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Brown coal	thousand metric tons	639	608	611	594	587
Lignite	do.	4,048	4,222	4,198	3,945	3,934
Natural gas	thousand cubic meters	6,000 e	4,900	5,040	4,335	4,163
Petroleum, crude		763	482	344	298	284

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. -- Zero.
[1]Table includes data available through November 2007.
[2]In addition to commodities listed, coke, common clay, and petroleum products also were produced, but available information is inadequate to make reliable estimates of output.
[3]Reporterd figure.

TABLE 13
SLOVENIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity
Alumina	KidričevoTalum d.o.o.	Plant at Kidricevo	120
Aluminum	do.	Smelter at Kidricevo	72
Cement	Salonit Anhovo	Plant at Anhovo	1,120
Coal:			
Brown	SOZC, Rudarsko Energetski Kombinat E. Kardelj	Mines: Sasavski Rudnici at Trbovlje, Hrastnik, Ojstro, Senovo, and Kanizarnica	1,300
Lignite	Rudarsko Energetski Kombinat Velenje, RO Rudnik Lignita-Velenje	Mine at Velenje	5,000
Lead metal	Rudnik Svinca in Topilnica, Mezica	Smelter at Mezica	35
Do.	do.	Refinery at Mezica	30
Petroleum, refined	Industrija Nafte d.d. Zagreb (INA) Rafinerija Nafte Lendava	Refinery at Lendava	16
Pig iron	Zdruzeno Podjetje Slovenske Zelezarne	Two blast furnaces at Zelazara Jesenice	300
Do.	Zelezara Store	Electric reduction furnaces at Store pri Celju	290
Steel, crude	Slovenske Zelezarne	Plant at Jesenica	400
Do.	do.	Plant at Ravne	162
Do.	do.	Plant at Store	140

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The Mineral Industries of Belgium and Luxembourg

By Harold R. Newman

BELGIUM

Belgium, a highly developed market economy, belongs to the Organization for Economic Cooperation and Development (a group of leading industrial countries) and is located at the heart of one of the world's most highly developed industrialized regions. Because it hosts few natural resources of its own, the country must import substantial quantities of raw materials and export a large volume of manufactures, which makes its economy unusually dependent on the state of world markets (World Group, 2006).

Minerals in the National Economy

Belgium's ferrous and nonferrous materials can be divided into the following three categories: base metals, such as aluminum, copper, lead, steel, and zinc; precious metals, such as gold, silver, and platinum; and specialty metals, such as cobalt, germanium, and indium. The country's total annual production of industrial minerals and building materials was estimated to be about 50 million to 60 million metric tons (Mt). Important producers of industrial minerals included SRC-Sibelco S.A., which was a world leader in silica sand production, and Carmeuse S.A., which was a world leader in the handling of limestone. Belgium was also a significant producer of cement (Mining Journal Online, 2006).

With exports equivalent to more than two-thirds of the gross domestic product (GDP), Belgium depends heavily on world trade. About three-quarters of Belgium's trade is with other European Union (EU) countries. In 2006, the trade with other EU countries accounted for $300.2 billion in exports (76.8% of Belgium's total exports) and $254.5 billion in imports (72% of Belgium's total imports). Germany was Belgium's top customer; the United States was ranked fifth (Belgium Foreign Trade Agency, 2007).

Industry, including minerals, accounted for 24% of the GDP. Exports of mineral products included but were not limited to mineral fuels, lubricants, and related materials (valued at $28,413); petroleum and related products ($18,985 million); diamond, other than industrial ($15,604 million); metalliferous ore and metal scrap ($3,417 million); copper ($3,212 million); and aluminum ($2,784 million). Imports of mineral products included but were not limited to mineral fuels, lubricants, and related materials (valued at $47,722 million); petroleum and related products ($30,500 million); diamond, other than industrial ($13.948 million); metalliferous ore and metal scrap ($7,498 million); aluminum ($3,115 million); and copper ($1,996 million) (United Nations, 2006).

Production

Mining was less important to the country's economy than in the past and, in 2006, mining was conducted only for industrial minerals. The refining of copper, minor metals, and zinc, and the production of steel were the leading mineral industries in Belgium. The country was also a producer of cadmium, cobalt, germanium, selenium, and tellurium. Belgium's well developed industrial minerals sector included the production of such industrial materials as carbonates and such construction materials as dolomite, limestone, and silica sand (table 1).

Structure of the Mineral Industry

The principal mining and mineral processing facilities in Belgium, with their locations and capacities, are listed in table 2. Most facilities were privately owned.

Commodity Review

Metals

Iron and Steel.—Arcelor S.A. and Mittal Steel N.V. announced that they had agreed on an improved bid for Arcelor ($33.1 billion) by Mittal Steel that would create the world's first steel producer with a production capacity of more than 100 million metric tons per year (Mt/yr). A combination of the two companies would give Mittal control of an estimated 11% of the world's annual output. The combination would create a world leader three times larger than its nearest rival, Nippon Steel Corp. of Japan (Forbes, 2006).

Zinc.—N.V. Umicore S.A. was an international metals and materials producer. Its activities were centered on the following four business areas: advanced materials, precious metals products and catalysts, precious metals services, and zinc specialties. In late 2006, Umicore and Ziniflex Ltd. of Australia agreed to a merger that would create the world's leading zinc producer by combining their smelting assets. The proposed deal would result in a smelting and refining entity that would employ 4,500 people and produce 1.2 Mt/yr of metals and materials. That is equal to 10% of the global demand for zinc in 2006 (Mining Engineer, 2007).

Industrial Minerals

Diamond.—The diamond district of Antwerp, which comprised four exchanges and about 1,500 diamond companies, was a leading diamond distribution center. Belgium was the world's leading exporter of diamond and precious stones. In 2006, 8.7 million carats of polished diamond was exported

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and 9.3 million carats of polished diamond was imported. The average per carat value of exports in 2006 was $1,088, which was up from $1,049 per carat in 2005. The United States remained the most important export market for cut diamond. The diamond sector accounted for 8% of Belgium's total exports. Eight in ten rough diamonds in the world are handled in Antwerp (Antwerp World Diamond Center, 2007).

Stone, Dimension.—Belgium, which has been an important producer of marble for more than 2,000 years, was recognized for the diversity and quality of its dimension stone. A dark blue-gray crinoidal limestone, which is referred to as "petit granit," was one of the most important facing stones that the country produced. All the marble quarries are located in the Walloon Region. Red, black, and gray are the principal color ranges of the marble, most of which was exported.

Mineral Fuels

Natural Gas.—N.V. Nederlands Gasunie and N.V. Nuon were to invest $425 million in building a 180-million-cubic-meter salt cavern-natural gas storage facility at Zuidwending. Controlled salt mining would create four subterranean caverns in which the natural gas would be stored. The caverns would lie at a depth of between 1,000 meters (m) and 1,500 m so that the gas would be stored more than 1,000 m below the surface. Natural gas has been stored in neighboring countries for many years (Platts, 2006).

The European Commission issued formal antitrust charges against Distrigas. The company was accused of abusing its dominant position in the Belgium gas market by locking in industrial customers through long-term gas supply contracts that shut out competitors. The charges could lead to fines of up to 10% of the group's global annual sales. Distrigas is part of Suez SA (the French energy group) and controls about 85% of the Belgian gas market (Financial Times, 2006).

Outlook

Belgium is expected to remain a significant mineral processor and major diamond trader in the world, as well as a globally significant handler of mineral products through its major ports. The four ports in Flanders (Antwerp, Ghent, Ostend, and Zeebrugge), which are all located within 100 kilometers of each other, are leading players in international and intra-European cargo handling. The seaport of Antwerp is a particularly important link in the chain of international trade. Antwerp is the 2d ranked cargo-handling port in Europe after Rotterdam and the 4th ranked cargo-handling port in the world; it is also the world's leading port for steel products and the world's 10th ranked port for container traffic.

References Cited

Antwerp World Diamond Center, 2007, Key figures—Polished diamonds: Antwerp, Belgium, Antwerp World Diamond Center. (Accessed January 31, 2007, at http://www.hrd.be/index.php?id=51.)

Belgium Foreign Trade Agency, 2007, Belgium—Breakdown of trade by continents in 2006, Belgium Foreign Trade Agency. (Accessed July 25, 2007, at http://www.abh-ace.org/import_en/infor-center/trade-statistics/world-trade/belgium-wt_en.html.)

Financial Times, 2006, EC antitrust charges hit Distrigas: Financial Times, May 15. (Accessed May 17, 2006, at http://www.news.moneycentral.msn.com/printarticle.asp.)

Forbes, 2006, Mittal, Arcelor agree on new bid: Forbes, April 4. (Accessed April 17, 2007, at http://www.forbes.com/markets/feeds/afx/2006/04/11/afx2662850.html.)

Mining Engineer, 2007, Ziniflex and Umicore to merge: Mining Engineer, January, v. 59, no. 1, p. 23.

Mining Journal Online, 2006, Countries and commodities reports—Belgium: Mining Journal Online. (Accessed January 29, 2007, at http://www.mining-journal.com/registered/Annual_Review_Article.aspx.)

Platts, 2006, Gasunie, Nuon to invest $425 million in new Groningen salt caverns: Platts, January16. (Accessed January 19, 2006, at http://www.platts.com/natural%20gas/news/8247986.xml.)

United Nations, 2006, Belgium Comtrade: United Nations. (Accessed June 18, 2008, at http://comtrade.un.org/pb/countrypages.aspx?y=2006.)

World Group, 2006, Belgium business guide: World Group. (Accessed July 24, 2007, at http://www.worldgroup.com/countries.asp?c=be&country=Belgium.)

LUXEMBOURG

Minerals in the National Economy

In 2006, Luxembourg's mineral industry comprised mainly mineral information systems, mineral trading, and raw materials processing. A member of the Belgium-Luxembourg Economic Union (BLEU), Luxembourg's trade statistics are inextricably linked with those of Belgium and, therefore, cannot be listed individually. The iron and steel industry was Luxembourg's most important mineral industry sector; steel was the country's main export commodity.

Production

Mining in Luxembourg was represented by small industrial mineral operations that produced material solely for domestic consumption. The minerals produced included dolomite, limestone, sand and gravel, and slate. Information on these operations was not readily available. Other commodities are listed in table 1.

Structure of the Mineral Industry

The principal mineral processing facilities in Luxembourg, with their locations and capacities, are listed in table 2. Most facilities were privately owned.

Commodity Review

Metals

Iron and Steel.—Acieries Reunies de Burbach-Eich-Dudelang (ARBED) dominated the country's mineral industry. ARBED was the major producer of crude steel, pig iron, and stainless steel, all of which were produced from imported material (Arcelor Group, 2006).

Arcelor Differdange SA, a world leader in the production of heavy steel sections, chose Danieli Morgardshammar Corp. for the major modification and modernization of its mill in Differdange, with the aim of enhancing plant operation, efficiency, and final product quality. The mill's product range

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included parallel-flange beams rolled in up to 120-meter lengths. Danieli's order, awarded in February 2006, will involve the complete rearrangement of the intermediate/prefinishing rolling mill area (Danieli Morgardshammar Corp., 2006).

Outlook

Luxembourg is expected to continue to be a producer and exporter of steel. The industrial mineral production will be limited to domestic consumption.

References Cited

Arcelor Group, 2006, Annual report: Arcelor Group. (Accessed September 1, 2007, at http://www.arcelor.com/index.php?lang=en&page=144.)

Danieli Morgardshammar Corp., 2006, Danieli to upgrade 1,100-mm beam mill at Arcelor Differdange, Luxembourg: Danieli Morgardshammar Corp. (Accessed July 28, 2006, at http://www.danielicorp.com/Danieli_Morgardshammar/Danieli_Morgard_News/danielimorgardshammarnews.htm.)

TABLE 1
BELGIUM AND LUXEMBOURG: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Country and commodity		2002	2003	2004	2005	2006[e]
BELGIUM[2]						
Metals:						
Aluminum, secondary, including unspecified metals[e]		300 r	200 r	100 r	100 r	125
Arsenic, white[e]		1,500	1,200	1,200	-- r	--
Bismuth, metal[e]		700	600	500	500	500
Cadmium, primary		117 e	100	--	--	100
Cobalt, primary[3]		1,135	1,704	2,947	3,298	2,840
Copper:						
Smelter, secondary		125,900	117,500	107,700 r	97,200	114,600 4
Refined, primary and secondary[e]		423,000	425,000	383,000	382,000	382,600 4
Iron and steel:						
Pig iron	thousand metric tons	7,988 r	7,813 r	8,224 r	7,254 r	8,000
Steel:						
Crude	do.	11,495	11,128	11,698	8,906 r	11,238 4
Hot-rolled products	do.	13,490 r	13,169 r	13,269 r	11,274 r	12,000
Lead, refined, secondary		88,000	69,800 r	63,400 r	63,400	97,200
Selenium[e]		200	200	200	200	200
Tin, metal, secondary, including alloys		8,900	7,700	8,900	7,800	7,600
Zinc:						
Slab:						
Primary		239,000	244,000	257,000	222,000	219,800 4
Secondary, possibly remelted zinc		70,000 4	42,000	46,000	40,000	40,000
Total		309,000	286,000	303,000	262,000	260,000
Powder		25,000	20,000	20,000	20,000	20,000
Industrial minerals:						
Barite[e]		30	30	27	27	28
Cement	thousand metric tons	8,152	7,469	7,379	7,594 r	8,192 4
Clay, kaolin[e]	do.	411	429	459	460 e	460
Lime and dead-burned dolomite, quicklime[e]	do.	1,800	1,800	2,400 r	2,300 r	2,400
Nitrogen, N content of ammonia	do.	842	874	857	890 r	825 4
Sodium sulfate[e]	do.	250	250	250	250	250
Stone:						
Worked monumental/building stone and articles thereof; in marble; travertine and alabaster excluding tiles; cubes/similar articles; largest surface less than 7 square meters; setts; kerbstones; flagstones		24,801	23,734	21,649	21,188	18,798 4
Natural stone setts; kerbstones and flagstones (excluding slate)		361,920	375,122	399,246	460,206	336,584 4
Sulfur:						
Byproducts:[e]						
Elemental		225,000	225,000	225,000	225,000	225,000
Other forms		175,000	175,000	175,000	175,000	175,000
Total		400,000	400,000	400,000	400,000	400,000
Sulfuric acid	thousand metric tons	1,477 r	1,235 r	1,332 r	1,332 r	1,393 4

See footnotes at end of table.

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TABLE 1—Continued
BELGIUM AND LUXEMBOURG: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Country and commodity		2002	2003	2004	2005	2006[e]
BELGIUM[2]—Continued						
Mineral fuels and related materials:						
Carbon black[e]	thousand metric tons	1,000	1,000	1,000	1,000	1,000
Coke, all types	do.	2,967	3,200 [e]	3,200 [e]	2,599 [r]	2,650 [4]
Gas, manufactured	thousand cubic meters	339,807	340,000 [e]	340,000 [e]	472,478 [r]	425,504 [4]
Petroleum, refinery products:[5]						
Liquefied petroleum gas	thousand 42-gallon barrels	15,537 [r]	15,605 [r]	12,304 [r]	10,669 [r]	10,247 [4]
Naphtha and white spirit	do.	18,497 [r]	21,908 [r]	20,540 [r]	14,531 [r]	11,158 [4]
Gasoline	do.	57,753 [r]	58,654 [r]	57,894 [r]	50,562 [r]	53,570 [4]
Kerosene	do.	96,594 [r]	100,849 [r]	95,533 [r]	13,005 [r]	13,512 [4]
Kerosene, other	do.	-- [r]	-- [r]	-- [r]	500 [r]	326 [4]
Distillate fuel oil	do.	-- [r]	-- [r]	-- [r]	89,056 [r]	94,443 [4]
Refinery gas	do.	-- [r]	-- [r]	-- [r]	3,682 [r]	3,864 [4]
Residual fuel oil	do.	50,639 [r]	57,872 [r]	55,811 [r]	53,563 [r]	47,472 [4]
Bitumen	do.	2,628 [r]	2,018 [r]	5,331 [r]	6,523 [r]	8,520 [4]
Total	do.	218,673 [r]	233,581 [r]	226,461 [r]	227,122 [r]	227,635 [4]
LUXEMBOURG						
Metals, steel:						
Crude	thousand metric tons	2,736	2,675	2,684	2,194	2,802 [4]
Hot-rolled products	do.	2,921 [r]	2,720 [r]	2,801 [r]	2,564 [r]	2,800
Industrial minerals:						
Cement, hydraulic[e]		700,000	700,000	700,000	700,000	700,000
Phosphates, Thomas slag:[e]						
Gross weight		475,000	475,000	475,000	475,000	475,000
P_2O_5 content		70,000	70,000	70,000	70,000	70,000

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. -- Zero.
[1]Table includes data available through May 2008.
[2]In addition to the commodities listed, Belgium produced a number of other metals and alloys, for which only aggregate output figures were available.
[3]Production reported by n.v. Umicore s.a. includes production from China and South Africa.
[4]Reported figure.
[5]Conversion factors for petroleum refinery products, in 42-gallon barrels per metric ton, are as follows: liquefied petroleum gas—11.6; naphtha and white spirit—8.5; gasoline—10; kerosene—7.75; distillate fuel oil—7.46; refinery gas—8.04; residual fuel oil—6.66; and bitumen—6.06.

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TABLE 2
BELGIUM AND LUXEMBOURG: STRUCTURE OF THE MINERAL INDUSTRIES IN 2006

(Thousand metric tons unless otherwise specified)

Country and commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
BELGIUM				
Cadmium, metal	metric tons	N.V. Umicore S.A. (Sté. Générale de Belgique, 50.2%)	Balen	1,800
Cement		Major companies:	Plants:	8,400
Do.		Cimenteries CBR SA (Heidelberg Group)	Major plants at Lixhe, Mons/Obourg, Harmignies, Marchienne, and Ghent	3,200
Do.[1]		Ciments d'Obourg SA (Holcim Group)	Plants at Obourg and Thieu	2,800
Do.		Compagnie des Ciment Belge (Ciments Français)	Plant at Gaurain-Ramecroix	2,400
Cobalt	metric tons	N.V. Umicore S.A. (Sté. Générale de Belgique, 50.2%)	Refinery at Olen	500
Copper		do.	Smelter at Antwerp-Hoboken	50
Do.		do.	Refinery at Olen	330
Do.		Metallo-Chimique NV	Smelter at Beerse	80
Dolomite		SA Dolomeuse (Group Lhoist)	Quarry at Marche les Dames	500
Do.		do.	Plant at Marche les Dames	750
Do.		SA de Marche-les-Dames (Group Lhoist)	Quarries at Nameche	3,000
Do.		do.	Plant at Nameche	3,000
Do.		SA Dolomies de Merlemont (Group Lhoist)	Quarry at Philippeville	100
Lead, metal		N.V. Umicore S.A. (Sté. Générale de Belgique, 50.2%)	Smelter at Antwerp-Hoboken	90
Do.		do.	Refinery at Antwerp-Hoboken	125
Limestone		Carmeuse S.A. (Long View Investment NV)	Mines and plant at Engis	1,850
Do.		do.	Mines and plant at Frasnes	450
Do.		do.	Mines and plant at Maizeret	850
Do.		do.	Mines and plant at Moha	800
Do.		SA Transcar (Royal Volker Stevin)	Mines and plant at Maizeret	850
Petroleum, refined	42-gallon berrels per day		Refinery at Antwerp	268,000
		Total S.A.		
Do.	do.	SA Esso NV	do.	239,000
Do.	do.	Nynas Petroleum NV	do.	125,000
Do.	do.	Belgian Refining Corp.	do.	80,000
Do.	do.	Petroplus Refining Antwerp NV	do.	55,000
Salt		Zoutman NV	Plant at Roeselare	200
Sand, silica		SRC-Sibelco SA	Mines and plants at Lommel, Mol, and Maasmechelen	500
Steel		Companies:	Of which:	14,000
		Cockerill Sambre SA (Government of Wallonia, 80%)	Plants at Liege and Charleroi	(5,000)
Do.		Sidmar NV (Belgian Government 28.24%, and Arcelor Group, 71.76%)	Plant at Ghent	(3,960)
Do.		Usines Gustave Boël NV	Plant at La Louviere	(2,020)
Do.		Forges de Clabecq SA	Plant at Clabecq	(1,500)
Do.		SA Fabrique de Fer de Charleroi	Plant at Charleroi	(600)
Do.		Alz Belgium NV	Plant at Genk-Zuid	(360)
Do.		New Tubemeuse (NTW) SA	Plant at Flemalle	(300)
Zinc, metal		N.V. Umicore S.A. (Sté. Générale de Belgique, 50.2%)	Smelter and refinery at Balen	450
LUXEMBOURG				
Cement		SA des Ciments Luxembourgeois (Acieries Reunies de Burbach-Eich-Dudelang, 50.2%, and Sté. Générale de Belgique, 25%)	Plant at Esch-sur-Alzette	450
Do.		Intermoselle SARL (Acieries Reunies de Burbach-Eich) Dudelang, 33%)	Plant at Rumelange	1,000
Steel		Acieries Reunies de Burbach-Eich-Dudelang (Arcelor Group)	Plants at Differdange, Dudelange, Esch-Belval, Esch-Schifflange	5,320
Do.		Arcelor Differdange SA (Arcelor Group)	Plant at Differdange	1,200
Do.		Ugine & ALZ Carnox (Arcelor Group)	do.	1,000

[1]Includes the capacity of the company SA Ciments de Haccourt.

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THE MINERAL INDUSTRIES OF CENTRAL EUROPE

CZECH REPUBLIC, HUNGARY, POLAND, AND SLOVAKIA

By Walter G. Steblez[1]

The Czech Republic, Hungary, Poland, and Slovakia, which are the most economically dynamic countries of the former centrally planned economy areas of Europe and Central Eurasia, joined the European Union (EU) on May 1, 2004. The denationalization of the iron and steel sectors continued in the Central European region. Mining in these countries continued to undergo rationalization to meet market economy norms and had a much-reduced share of industrial production and of the gross domestic product (GDP) than it had during the years of central economic planning when Government policies dictated mineral self-sufficiency at all costs.

CZECH REPUBLIC

The Czech Republic was an important Central European producer of heavy industrial goods manufactured by the country's chemical, machine building, and toolmaking industries. Steelmaking, the mining and processing of industrial minerals, and the production of construction materials continued to be of domestic and regional importance.

Minerals in the National Economy

In 2006, the Czech Republic's real GDP increased by 6.4% compared with that of 2005. The value of industrial production increased by 11.2% compared with that of 2005; the value of mining and quarrying increased by about 2.5%, of which the mining and quarrying of mineral fuels and nonmineral fuels increased by 0.6% and 7.2%, respectively. In 2006, mining and quarrying constituted 1.4% of the Czech economy's net value of output and a 2.5% share in the value of industrial output (GEOFOND, 2007, p. 18, 28; Czech Statistical Office, 2008).

Government Policies and Programs

The Government continued programs of economic development that were consonant with the EU's criteria for newly admitted and applicant countries. The country's memberships in the International Monetary Fund, the Organisation for Economic Co-operation and Development (OECD), the World Bank, and the World Trade Organization, as well as participation in the General Agreement on Tariffs and Trade, were largely an outcome of the Czech Republic's full orientation toward Western European political and economic values.

Three constituent Acts compose the country's mining law, which forms the foundation of the Government's mining and other mineral-related policies. These are Act No. 44/1988 Coll., On Protection and Use of Mineral Resources (the Mining Act), as amended; the Czech National Council Act No. 61/1988 Coll., On Mining Activity, Explosives, and State Mining Administration (Authority/Sedenka), as amended; and the Czech National Council Act No. 62/1988 Coll., On Geological Works, as amended. The Mining Act classifies minerals as either "reserved" or "unreserved." The "reserved" category refers to mineral deposits that, apart from immediate market considerations, are determined to be necessary for the development of the national economy (GEOFOND, 2004, p. 10, 11).

Other provisions in the Mining Act (law) address issues of licensing and Federal and regional compliance with environmental regulations during the exploration and exploitation of mineral deposits and the reclamation of mined-out areas. These regulations compose the environmental law of 1997 (Act No. 125/1997), which became in force on January 1, 1998. The environmental law focuses on reducing the volume of waste, on the collection of waste by category, and on recycling. The law adopts the main provisions of EU and OECD regulations and the Basel Convention. The catalog of wastes is compatible with the European Catalogue of Wastes of the EU.

Production

In 2006, the Czech Republic reported production increases for such major metals as iron, steel, and steel semimanufactures. The estimated output of secondary refined metals (with the exception of lead, which reported a production increase) remained at about their same levels of production as in 2005 (table 1). Positive growth in the construction materials sector included the output of common sand and gravel, dimension stone, glass sand, and limestone. Production of gypsum continued to decrease; the production of coal increased, however. Among mineral fuels, production decreases were reported for natural gas and crude petroleum.

Structure of the Mineral Industry

Table 2 presents information on the significant mineral production facilities of the Czech Republic.

Commodity Review

Metals

The Czech Republic's metals sector produced a broad range of base metals and semimanufactures from imported ores and secondary materials (scrap). Although interest in gold mining continued in some parts of the Czech Republic, other metals reportedly were depleted. According to official data, with the exception of gold, the country's metallic mineral deposits as of

[1]Deceased.

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December 31, 2006, were not economic (GEOFOND, 2007, p. 309-373).

Copper.—The Czech Republic's sources of copper were entirely based on secondary materials and imports. In 2006, the Czech Republic remained a net exporter of copper waste and scrap, which amounted to 49,058 metric tons (t) and was an increase of about 2% compared with net copper scrap exports in 2005 (GEOFOND, 2007, p. 330).

Gold.—Gold was the only metal for which resource and reserve estimates were available. According to the Czech Geological Survey, as of December 31, 2006, total resources of gold were estimated to be almost 240 t; reserves were about 84 t (GEOFOND, 2007, p. 369).

Iron and Steel.—All the raw materials consumed by the country's steel industry—iron ore and concentrate, and pellets and agglomerate—were imported. The steel industry operated eight steel plants with a collective capacity to produce almost 11 million metric tons per year (Mt/yr) of steel. The main steel producers were, in order of crude steel production capacity, Mittal Steel Ostrava (Nova Hut s.p.) (3,800 Mt), Trinecke Zelezarny (3,000 Mt), Poldi Hutte s.r.o. (a subsidiary of Scholz Edelstahl A.G., 1,700 Mt), and Zelezarne Vitkovice [(ZV), a subsidiary of the Evraz Group of Russia, 900 Mt], and accounted for more than 87% of the country's total crude steel production capacity.

In 2006, the iron and steel industry remained the dominant constituent of the country's metallurgical sector. The output of pig iron increased by more than 12% compared with that of 2005; crude steel production fell by about 12% (table 1). GEOFOND's trade data for 2006 indicate that total imports of iron ore and concentrates amounted to about 8 million metric tons (Mt), or about 17% more than total imports of these commodities in 2005. Ukraine (about 48%) and Russia (about 45%) accounted for the major share of the Czech Republic's imports of iron ore and concentrate. Net imports of pig iron amounted to about 132,000 t, which was an increase of about 81% compared with those of 2003. Net exports of iron and steel scrap amounted to about 936,000 t, which was a decrease of about 31% compared with those of 2005. Germany, which remained the principal importer of iron and steel scrap from the Czech Republic, imported 830,000 t of iron and steel scrap in 2006 (GEOFOND, 2007, p. 314).

Lead and Zinc.—Imports constituted the Czech Republic's sources of lead and zinc. In 2006, net imports of unwrought lead and zinc amounted to 57,495 t and 34,434 t, respectively. Germany and Poland, respectively, were the Czech Republic's principal suppliers of lead and zinc (GEOFOND, 2007, p. 337, 344).

Industrial Minerals

The Czech Republic was well endowed with and produced a broad range of industrial minerals that met most domestic construction and chemical industry requirements, as well as those for export. The availability of these mineral resources at the recent (2002 to 2006) average rate of mining ranged from about 46 years for gem-grade pyrope ore to about 1,535 years for gypsum. Such corrective additives as clays, loams, loess, sands, and shales needed by the country's cement industry to regulate the content of aluminum oxide (Al_2O_3), iron oxide (Fe_2O_3), and silicon oxide (SiO_2) during clinker production were reported to have a combined mine life of about 1,416 years. Limestone, kaolin, and glass sand (in order of deposit sizes) were the industrial minerals that had the largest resources suitable for exploitation (GEOFOND, 2007, p. 167, 168).

Among industrial minerals, dimension stone and sand and gravel output increased by about 2% and 1%, respectively, compared with that of 2005. The output of diatomite rose by 39% compared with that of 2005. Although dolomite production declined by about 2.4% in 2006 compared with that of 2005, net imports during the year amounted to 428,377 t, which was an increase of 22% compared with that of 2005 (table 1).

Mineral Fuels and Related Materials

Coal.—Bituminous or hard coal occurs mainly in the Upper Silesian Basin. Of the resources in this region, only about 15% is located in the Czech Republic; the balance of the resources is located in Poland. In addition to bituminous coal, the Czech Republic differentiates two types of lower rank coal—brown coal and lignite. The Czech Republic's brown coal deposits are worked in the northwestern part of the country in the Bohemian brown coal basins. The major brown coal basins are found in the Krusne hory Mountains region and cover an area of 1,900 square kilometers (km^2). Coal also is mined in the Cheb, the Sokolov, and the Zitava basins. In 2006, the production of bituminous coal increased by about 1.9% compared with that of 2005, and production of brown coal and lignite increased by almost 1% during this period (table 1). In 2006, imports of bituminous coal amounted to almost 2 Mt; net exports were more than 4.5 Mt, or about 14% more than those in 2005 (GEOFOND, 2007, p. 129-148).

Natural Gas.—Natural gas production declined by about 58% compared with that of 2005; this decline tracks a substantial decline in the output of petroleum during the same period and suggests that the decline of natural gas output pertained mainly to the associated gas portion of natural gas production. In 2006, net imports of natural gas amounted to 9,675 million cubic meters, of which about 75% was imported from Russia. Total resources of natural gas as of December 31, 2006, were estimated to be about 48 billion cubic meters; exploitable reserves were put at more than 28 billion cubic meters (GEOFOND, 2007, p. 162).

Petroleum.—In 2006, the Czech Republic produced about 15% less petroleum than in 2005 (table 1). Russia remained the country's main supplier of petroleum, having accounted for about 67% of the total petroleum imports in 2005 (about 7.8 Mt) and 2006 (about 7.7 Mt). The Czech Republic's petroleum resources as of December 31, 2004, amounted to about 32.3 Mt, of which about 2.1 Mt was categorized as exploitable reserves (GEOFOND, 2007, p. 154).

Uranium.—In 2006, mine output and concentrator production of uranium declined by about 9% and 12%, respectively, compared with their output levels in 2005 (table 1). Domestic sources of uranium were able to meet only 47% (2005 data) of the fuel requirements of the Dukavany and the Temelin nuclear

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powerplants; the balance of the uranium required by these plants was imported. All uranium was sent abroad for processing. The TVEL Co. of Russia and the Westinghouse Corp. of the United States were the suppliers of fabricated nuclear fuel for the Dukavany and the Temelin plants, respectively. TVEL was scheduled to replace Westinghouse as the supplier of nuclear fuel to Temelin in 2010 (GEOFOND, 2007, p. 125).

Outlook

The Czech Republic is expected to continue to rely on imports of natural gas and petroleum, given the country's limited resources of these energy minerals. Import reliance on base and precious metals also will continue, although demand is not expected to increase significantly owing to the fairly high technological level of the Czech Republic's fabrication and service sectors. In these sectors, material input per unit of output is expected to continue to decline from the high level of material input in production during the country's central economic planning period.

References Cited

Czech Statistical Office, 2008, Statistical yearbook of the Czech Republic 2007: Prague, Czech Republic, Czech Statistical Office, January 3, sec. 16-3.
GEOFOND, 2004, Mineral commodity summaries of the Czech Republic 2003: Prague, Czech Republic, Ministry of the Environment of the Czech Republic, June, 210 p.
GEOFOND, 2007, Mineral commodity summaries of the Czech Republic 2006: Prague, Czech Republic, GEOFOND, October, 383 p.

HUNGARY

Bauxite remained the only major nonfuel mineral produced in Hungary that was significant in terms of European mineral production. In 2006, Hungary maintained production of modest amounts of fossil fuels, industrial minerals, and metals. Despite substantial production of bauxite and alumina, Hungary's production of primary aluminum remained modest owing to limited domestic sources of energy. The production of coal, natural gas, and petroleum was sufficient to satisfy only about one-third of the country's annual energy needs.

Minerals in the National Economy

In 2006, mining and quarrying and the production of basic metals, industrial mineral products, and coke and refinery products accounted for 17% of the value of industrial production. The total value of industrial production, which increased by 5.9% compared with that of 2005, constituted 25.4% of Hungary's gross domestic product (GDP). The GDP increased by almost 4% compared with that of 2005. Investment in mining and quarrying in 2006, however, declined by about 14% (Hungarian Central Statistical Office, 2007a, p. 18, 22, 24).

Government Policies and Programs

The Government based its regulatory policies for mining and geologic survey work on provisions in the Mining Law of 1993 (Act No. XLVIII). Section 50 of the Mining Law was the basis for Governmental Decree No. 132/1993, which constitutes the legislative underpinning for the Hungarian Geological Survey. The Mining Law and related decrees and codes established the legislative bases for estimating reserves, determining environmental risks associated with mining, and providing the geologic and technical information needed to outline tender conditions.

Government agencies that are responsible for enforcing existing environmental protection laws and regulations include the Ministry of the Environment and Regional Planning (KTM) and the Hungarian Mining Office (MBH). The KTM is authorized to help only in the enforcement of existing environmental legislation prescribed by other ministries of the Government. With respect to mining and minerals, Hungary's Ministry of Industry and Commerce has the primary responsibility for establishing environmental regulatory standards. The chief responsibility of the MBH is that of a certifying agency, which can review only technical developmental and operational plans. These plans are required to include provisions that pertain to environmental protection and land restoration by responsible entities.

Production

In 2006, the output levels of metal ores and metals did not significantly vary from the output levels of 2005. Minor increases in production were reported for bauxite, pig iron, and crude steel (table 3). The production results for industrial minerals in 2006 were mixed. Production decreases were reported for bentonite, gypsum, and common and foundry sands compared with their respective output levels in 2005; increases were reported for the output of dolomite, gravel, limestone, and silica (glass) sand. With the exception of crude petroleum, Hungary reported modest output increases of fossil fuels (table 3).

Structure of the Mineral Industry

Table 4 presents information about the major mineral facilities in Hungary.

Commodity Review

Metals

To meet its economic requirements, Hungary continued to depend on imports of most metals (ores and concentrates and billets). In 2006, the value of Hungary's imports of nonferrous metals exceeded exports by about 48%. Similarly, iron and steel imports exceeded exports by about 97%. Bauxite mining and refining to alumina and manganese mining (manganese carbonate and oxide ores mined at Urkut) remained the only major metal mining and processing operations in Hungary. Gallium was produced as a byproduct of alumina refining.

Bauxite and Alumina and Aluminum.—Bakoni Bauxitbanya Kft. [Bakony Bauxite Mines Ltd., a subsidiary of Magyar Aluminium Ltd. (MAL)] mined bauxite in the Bakony District. Hungary's total resources of bauxite as of December 31, 2003, were estimated to be about 39 million

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metric tons (Mt) with a range of 47% to 52% Al_2O_3, 20% to 25% Fe_2O_3, and 6% to 8% SiO_2. About one-third of the bauxite was mined by the open pit method; the balance was mined underground at the Fenyofo and the Halimba Mines. In 2006, bauxite production rose slightly by about 1% compared with that of 2005; the production of primary aluminum increased by almost 11% (table 3). In early 2006, owing to high energy costs, MAL closed down the Inota aluminum smelter and brought into production two secondary aluminum furnaces (Magyar Aluminium Ltd., 2007).

Gold.—Carpathian Gold Corp. of Canada continued to explore for gold in northern Hungary. Carpathian's four exploration licenses covered an area of about 134 square kilometers (km^2). In 2006, exploration work proceeded in the Tokaj Mountains on the Mad-Kiralhegy and the Sarospatak-Kiralhegy license areas and on the Fuzerradvany concession in the Matra Mountains. The company's Kanasvar license (located near the old Lahoca gold deposit) encompassed an area of about 2.45 km^2 (Carpathian Gold Corp., 2007, p. 4, 7, 25).

Iron and Steel.—In 2006, Hungary's production of pig iron showed slight gains (0.045%) compared with that of 2005; the output of crude steel increased by about 3.4% during the same period (table 3). Major activities at Dunaferr Dunai Vasmu Rt.'s (Dunaferr Co. Ltd.'s) integrated steel mill included the upgrading of the No. 1 blast furnace and the No. 3 coke battery, which would maintain production at 2006 levels (Dunaferr Co. Ltd., 2006a, b).

Manganese.—In 2006, the output of mainly manganese carbonate ore at the Urkut Mine in the Bakony Mountains amounted to about 50,000 metric tons (t), which was about the output level of 2005. Hungary's manganese ore was used to produce mainly blast furnace ferromanganese (table 3).

Industrial Minerals

Hungary produced a broad range of industrial minerals that included aggregates, bentonite, kaolin, and perlite. Such industrial minerals as construction aggregates and cement continued to play an important role in Hungary's economy, especially in the modernization of the country's infrastructure. Highway construction planned through 2008 would continue to be an important element in the development of the country's infrastructure.

Mineral Fuels

In 2006, Hungary reported a decline of about 7% in crude petroleum production compared with that of 2005. Domestic output of natural gas increased by almost 3% during the same period (table 3). Because of limited domestic resources (about 22 Mt), most petroleum (9 Mt) continued to be imported from Russia via the Friendship pipeline. Similarly, a substantial and increasing amount of natural gas was imported from Russia through Russia's gas-main network. In 2006, Hungary's imports of natural gas and petroleum increased by about 43% and 25%, respectively (Hungarian Central Statistical Office, 2007b, p. 253).

Hungary classifies its coals into three categories—hard coal (bituminous), brown coal, and lignite. Brown coal and lignite were mined, for the most part, to fuel the country's thermal electric power stations. Lignite was mined by open pit at the Bukkabrany and the Visonta Mines; the output from these mines was used entirely at the Matra electric powerplant. In 2006, the combined output of lignite and brown coal increased by about 3% compared with that of 2005 (table 3).

Outlook

Hungary will continue to rely on imports of natural gas and petroleum and most metals. The need to develop modern infrastructure that conforms to EU standards is expected to stimulate an increase in the consumption of construction-related industrial minerals and base metals.

References Cited

Carpathian Gold Corp., 2007, 2006 annual report: Toronto, Ontario, Canada, Carpathian Gold Corp., January, 35 p.

Dunaferr Co. Ltd., 2006a, Blast furnace revamp completed on time: Dunaújváros, Hungary, Dunaferr Co. Ltd. press release, September 4, 1 p.

Dunaferr Co. Ltd., 2006b, Coking battery no. 3 is working at its full capacity: Dunaújváros, Hungary, Dunaferr Co. Ltd. press release, March 17, 1 p.

Hungarian Central Statistical Office, 2007a, Economy and society, January-November 2007: Budapest, Hungary, Hungarian Central Statistical Office, November, 45 p.

Hungarian Central Statistical Office, 2007b, Statistical yearbook of Hungary 2006: Budapest, Hungary, Hungarian Central Statistical Office, November, 493 p.

Magyar Aluminium Ltd., 2007, MAL Hungarian aluminium production and trade company limited by shares: Ajka, Hungary, Magyar Aluminium Ltd. press release, 1 p.

POLAND

Poland is endowed with significant mineral resources, which include bituminous coal, copper and lead-zinc ores, salt, silver, and sulfur. In 2006, the country's reserve base of copper amounted to more than 5% of the world total (Edelstein, 2008). Although world reserves of elemental sulfur in 2006 were not available, Poland's production of sulfur represented almost 2% of total world output (Ober, 2008). Resources of coal and salt were considered to be of world significance; Poland's share of global reserves of silver amounted to about 19% (Brooks, 2008). The latest available inventory of the country's mineral resources indicated net gains in geologically documented resources, mainly for bituminous coal, ceramic clays, coal bed methane, and sulfur (table 7).

In 2006, after Russia, Poland remained the leading producer of copper in Europe and Central Eurasia and remained among the top 10 world mine producers of copper (Edelstein, 2008). Poland also continued to be among the leading world producers of nitrogen (in ammonia), salt, silver, and sulfur. In Europe and Central Eurasia, the country was a significant producer of lead and zinc and a leading producer of lime. According to the most recent data available (2004), Poland accounted for about 2% of the total world output of bituminous coal (Główny Urząd Statystyczny, 2007a, p. 567; U.S. Energy Information Administration, 2007; Smith, 2008; Tolcin, 2008).

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Minerals in the National Economy

According to the International Monetary Fund (2007), Poland's real gross domestic product (GDP) registered a growth of 6.1% compared with that of 2005; industrial production in constant prices increased by about 9.2% compared with that of 2005. During the same period, the value of output of the mining and quarrying sector in constant prices declined by about 1.2%. In 2006, the value of the gross output of industry represented about 22% of the GDP; the value of mining and quarrying output was 2.5% of the GDP (Główny Urząd Statystyczny, 2007a, p. 464).

Government Policies and Programs

The Government of Poland remained fully committed to privatizing the country's industry. The latest available data (2005) report that of the 2,209 mining enterprises, 16 were state-owned, and the balance came under various privatization regimes (Główny Urząd Statystyczny, 2007a, p. 478; Ney and Smakowski, 2007, p. ix). Steel trade issues and efforts to restructure and privatize Poland's steel industry continued to be among the leading mineral industry concerns during the year.

Production

In 2006, among the major metals, production increases were reported for aluminum, copper (in ore and smelter), pig iron and crude steel, and hot-rolled steel semimanufactures. Output decreased for refined zinc (table 5). Among the major industrial minerals, production increases were reported for, among others, bentonite, cement (hydraulic), gypsum, and salt; production decreases were reported for kaolin and soda ash. Compared with output levels in 2005, production declines in 2006 were reported for natural gas and petroleum (table 5).

Although Poland was a leading European producer and processor of nonfuel minerals and mineral fuels, Poland still depended heavily on imports to meet demand. According to the Mineral and Energy Economy Research Institute of Poland's Academy of Sciences, of the 121 mineral commodities that were reviewed, 56 (40%) were in the category of total import dependence. Additionally, seven mineral commodities, or about 6% of the total, were in the category of import dependence of more than 50% (Ney and Smakowski, 2007, p. xi-xvii).

Structure of the Mineral Industry

Limited-liability companies, joint-stock companies, and partnerships constituted about 80%, 11%, and 4%, respectively, of the total mining enterprises. Table 6 provides information on the major mineral facilities in Poland.

Commodity Review

Metals

Aluminum and Bauxite and Alumina.—Poland's primary aluminum, which was produced in Konin by Aluminium Konin-Impexmetal S.A. (Konin), was based entirely on imported alumina. Alumina imports in 2005 (the latest year for which trade data were available) amounted to about 145,000 metric tons (t) and were chiefly used in primary aluminum production (table 8). A small amount (less than 15%) was used in the nonmetallurgical sphere (cement, chemicals, glass, and refractories).

In 2006, the production of primary aluminum metal increased by about 6% compared with that of 2005. Imports of aluminum and aluminum products increased by about 6% during the same period (table 8). Exports of aluminum and aluminum products during the same period rose by about 16% (table 9). Apparent consumption in 2005 declined by about 16% (Ney and Smakowski, 2007, p. xi-xvii). In 2006, Zaklady Metali Lekkich SA, which produced aluminum semimanufactures, announced plans to allocate about $65.2 million to purchase aluminum semimanufactures operations in Germany—a major market for aluminum products used in the construction sector (Metals Insider, 2006d, p. 6).

Cadmium.—Because of its association with sphalerite (zinc-iron sulfide), cadmium in Poland was produced as a byproduct of lead and zinc mining and processing operations in the Silesia-Krakow region. Cadmium reserves as of December 31, 2005, amounted to 66,450 t (contained cadmium), of which 21,990 t (contained cadmium) was being worked (Ney and Smakowski, 2007, p. 69).

Copper.—All copper ore in Poland was mined by Kombinat Gorniczo Hutniczy Miedzi (KGHM) Polska Miedz S.A. (KGHM, S.A.), which was a major world copper mining, beneficiation, smelting, and refining complex in the Lubin area. KGHM accounted for about 3.4% of world mine copper production in 2006. Using the room and pillar method, the ore was worked at the Lubin, the Polkowice-Sieroszowice, and the Rudna Mines at five deposits at depths that ranged from 600 to 1,200 meters (about 1,900 to 3,700 feet). Chalcocite was the principal mineral in the ore; smaller amounts of bornite and chalcopyrite also were present. The mineralization is mainly in a shale horizon, but extends also into overlaying carbonate and underlying sandstone layers. As of December 31, 2005, total copper resources amounted to almost 2.0 billion metric tons (Gt), which contained about 39 million metric tons (Mt) of copper. Resources that were under exploitation amounted to about 1.6 Gt of ore that contained about 34 Mt of copper (table 7).

The Rudna Mine was the leading copper ore producer. The concentrator at Rudna processed Rudna ores, as well as some ores from the Polkowice-Sieroszowice Mine. Annual output by the Polkowice-Sieroszowice Mine and concentrator amounted to about 9.2 Mt/yr of ore and 450,000 t/yr of concentrate. The Lubin Mine accounted for about 7.5 Mt/yr of ore to produce about 465,000 t/yr of concentrate (Ney and Smakowski, 2007, p. 139).

In 2006, Poland's production of copper (in ore) increased by about 9% compared with that of 2005. The recovery of copper in concentrate increased by about 7% compared with that of 2005. The estimated total output of primary smelter copper registered an increase of about 1% in 2006. The total output of electrolytically refined copper (primary and secondary) decreased by about 1% compared with that of 2005 (table 5).

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Trade data for 2005 show that Poland's net exports of unwrought refined copper and copper alloys increased by about 3.2% compared with that of 2004. In 2005 (the latest year for which data were available), Germany, France, China, and Austria (in order of the value of imports) were the principal importers of copper from Poland (table 9; Ney and Smakowski, 2007, p. 139).

In late 2005, KGHM officials indicated that the company must develop new copper deposits given that the current deposits in Poland face depletion in 11 years. To ensure the availability of future supplies of copper ore and concentrate, KGHM reported looking at additional investments in the Democratic Republic of the Congo [Congo (Kinshasa)], Peru (Rio Blanco copper project), and the Philippines (Metals Insider, 2005, 2006a; Mining Journal, 2005). Although in 2006 Poland continued to study investment possibilities in Peru, high global copper prices forced KGHM's retreat from its investment projects in Congo (Kinshasa). According to KGHM officials, the company would turn their efforts to developing more cost-effective domestic deposits (Creamer's Media Mining Weekly, 2006; Metals Insider, 2006c, p. 13; Reuters, 2006). Activities in Poland's copper sector included a contract agreement concluded by KGHM and Netherlands trading house Trafigura Beheer for KGHM's delivery of 3,000 t of copper products valued at about $39 million. KGHM also signed a contract valued at $317 million that called for supplying cathodes to German firms MKM Mansfelder Kupfer and Messing GmbH (Metals Insider, 2006a, p. 11; 2006b, p. 10).

Gold.—In 2006, Poland's gold production continued to be based almost entirely on the country's copper mining operations. The gold content of the copper concentrates produced by KGHM was reported to be about 1 gram per metric ton (g/t); total reserves were determined to be about 50 t (Ney and Smakowski, 2004, p. 202). In 2006, KGHM's copper refineries continued to increase the output of byproduct gold. The gold was recovered at KGHM's 550-kilogram-per-year precious metals plant (Boliden, Klado method), which was a division within the Glogow smelter and refinery. The amount of gold recovered at Glogow has varied with the proportion of ores produced at the three mines, each of which has a different average gold content. Poland's annual domestic consumption of gold during the 2001 to 2005 period ranged from about 352 kilograms (kg) to 595 kg (table 5; Ney and Smakowski, 2007, p. 210).

Iron and Steel.—In 2006, the total output of pig iron and crude steel increased by about 18% and 8%, respectively, compared with that of 2005 (table 5). Poland depended on imported iron ores and concentrates, and on such alloying materials as manganese ore and chromite to produce the ferroalloys that were needed by the steel industry. According to the latest available trade data (2005), imports of iron ore and concentrate declined by almost 38% compared with those of 2004. Imports of such semimanufactures as flat-rolled and stainless steel products, however, increased by more than 25% (table 8).

Facility expansion projects in 2006 included the acquisition of a new wire mill by P.P. Huta "Zawierciu" valued at $40 million. The installation of the new mill was scheduled for completion in mid-2008 and would comprise a 4-stand reduction mill and a 10-stand wire rod block with a capacity to produce 150 metric tons per hour of product with diameters ranging from 5 to 25 millimeters (PR Newswire, 2006).

Lead and Zinc.—Poland worked 3 of the 21 known lead-zinc deposits in the Silesia-Krakow area, which hosted about 41 Mt of ore of the country's total resource of about 180 Mt of lead and zinc ore. Lead and zinc also were recovered from copper ore mined by KGHM in the Lubin region. About 33% of total mined lead came from copper mining and processing. Despite the presence of sphalerite in KGHM's copper deposits, the low zinc content of the ore made metal recovery uneconomical to implement (Ney and Smakowski, 2007, p. 506). In 2006, total mine production of lead in ore declined by about 19% compared with that of 2005; zinc in concentrate increased by 8%. The total output of refined lead (primary and secondary) in 2006 increased by about 8% compared with that of 2005 (table 5). In 2005, the total volume of refined lead imports rose by 3% (table 8). In 2006, total refined zinc output (smelter and electrolytic) declined by about 2% compared with that of 2005.

Silver.—In 2006, Poland remained among the major world producers of silver and accounted for more than 6% of world mine production (Brooks, 2008). Copper and, to a lesser extent, lead and zinc mining were Poland's domestic sources of primary silver, which was associated with these ores. The country's copper mining, smelting, and refining complex, which was operated by KGHM in the Lubin area, produced about 98% of the country's byproduct silver. In 2005 (the latest year for which data were available), exports of silver fell sharply by 53%. The top three importers of Polish silver in 2006 were (in descending order of value) the United Kingdom, Germany, and Belgium (Główny Urząd Statystyczny, 2007b, p. 261).

Industrial Minerals

Poland produced a broad range of industrial minerals that included calcareous and silicate rocks and aggregates, clays, feldspar, gypsum, magnesite, salt, and sulfur, which served the needs of the country's chemical and construction industries. Poland remained among the leading world producers of lime, nitrogen (in ammonia), salt, and sulfur (Kostick, 2008; Kramer, 2008; Miller, 2008; Ober, 2008).

Mineral Fuels

Coal.—In 2006, bituminous coal production declined by about 2% compared with that of 2005. In 2005, the country's net exports of bituminous coal and anthracite were about 8% less than those in 2004 (Ney and Smakowski, 2007, p. 506). Germany, Austria, the United Kingdom, and France (in order of volume) were the major importers of Polish coal (Ney and Smakowski, 2007, p. 232).

The Upper Silesian, the Lower Silesian, and the Lubin Basins have exploitable resources that amounted to 43,321 Mt of coal in 132 deposits. The Upper Silesian Basin represents the major portion of the country's total reserves, hosting about 79% of the total in 110 deposits (Ney and Smakowski, 2004, p. 224).

Natural Gas and Petroleum.—Poland depended on imports to meet its needs for oil and gas. In 2005, Poland's imports

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of petroleum increased by almost 2% compared with those of 2004 (table 8). The Russian Federation remained Poland's chief supplier of hydrocarbons which, in 2005 (in terms of volume), supplied about 98% and 64%, respectively, of Poland's imports of petroleum and natural gas (Ney and Smakowski, 2007, p. 191, 339).

Outlook

Poland is expected to remain an important world supplier of copper, salt, and sulfur and a major supplier of coal, lead, and zinc to the European market. The country, however, will continue to rely on imports of natural gas and petroleum and iron ore and concentrate. As domestic sources of nonferrous metals become exhausted (2015 and beyond), Poland will increasingly depend on imports of commodities.

References Cited

Brooks, W.E., 2008, Silver: U.S. Geological Survey Mineral Commodity Summaries 2008, p. 152-153.

Creamer's Media Mining Weekly, 2006, Polish copper group pulls out of Congo: Johannesburg, South Africa, Creamer's Media Mining Weekly, July 17, 1 p.

Edelstein, D.L., 2008, Copper: U.S. Geological Survey Mineral Commodity Summaries 2007, p. 54-55.

Główny Urząd Statystyczny, 2007a, Maly rocznik statystyczny Polski (Concise handbook of Poland's statistics): Warsaw, Poland, Główny Urząd Statystyczny, June, 710 p.

Główny Urząd Statystyczny, 2007b, Rocznik Statystyczny Handlu Zagranicznego (Statistical yearbook of Poland's foreign trade): Warsaw, Poland, Główny Urząd Statystyczny, October, 662 p.

International Monetary Fund, 2007, Poland, *in* World economic outlook database: Washington, DC, International Monetary Fund, October. (Accessed February 22, 2008, via http://www.imf.org/external/pubs/ft/weo/2007/02/weodata/index.aspx.)

Kostick, D.S., 2008, Salt: U.S. Geological Survey Mineral Commodity Summaries 2008, p. 140-141.

Kramer, D.A., 2008, Nitrogen (Fixed)—Ammonia: U.S. Geological Survey, Mineral Commodity Summaries 2008, p. 118-119.

Metals Insider, 2005, Poland's KGHM said studying copper mine investments in Peru: London, United Kingdom, Metals Insider, December 16, p. 9.

Metals Insider, 2006a, Poland's KGHM announces two major supply deals: London, United Kingdom, Metals Insider, January 19, 22 p.

Metals Insider, 2006b, Poland's KGHM signs new contract with Trafigura Baheer: London, United Kingdom, Metals Insider, September 13, 25 p.

Metals Insider, 2006c, Poland's KGHM to focus on developing domestic resources: London, United Kingdom, Metals Insider, December 6, 32 p.

Metals Insider, 2006d, Polish aluminum manufacturer allocates funds for German buy: London, United Kingdom, Metals Insider, October 27, 22 p.

Miller, M.M., 2008, Lime: U.S. Geological Survey Mineral Commodity Summaries 2008, p. 96-97.

Mining Journal, 2005, KGHM eyes Rio Blanco: Mining Journal, April 15, p. 1.

Ney, Roman, and Smakowski, Tadeusz, eds., 2004, Bilans Gospodarki Surowcami W Polce Na Tle Gospodarke Swiatowoj 1998-2003 (Minerals yearbook of Poland 1998-2003): Krakow, Poland, Polish Academy of Sciences, Ministry of Environmental Protection, Natural Resources and Forestry, December, 515 p.

Ney, Roman, and Smakowski, Tadeusz, eds., 2007, Bilans Gospodarki Surowcami W Polce Na Tle Gospodarke Swiatowoj 2001-2005 (Minerals yearbook of Poland 2001-2005): Krakow, Poland, Polish Academy of Sciences, Ministry of Environment, December, 521 p.

Ober, J.A., 2008, Sulfur: U.S. Geological Survey Mineral Commodity Summaries 2008, p. 164-165.

PR Newswire, 2006, Commercial Metals Company's Polish mill announces purchase of a new wire rolling mill: New York, New York, PR Newswire, December 18, 1 p.

Reuters, 2006, Poland's KGHM studies $500 mln Peru investment: London, United Kingdom, Reuters, June 12, 1 p.

Smith, G.R., 2008, Lead: U.S. Geological Survey Mineral Commodity Summaries 2008, p. 94-95.

Tolcin, A.C., 2008, Zinc: U.S. Geological Survey Mineral Commodity Summaries 2008, p. 190-191.

U.S. Energy Information Administration, 2007, International energy annual 2005: Washington, DC, U.S. Energy Information Administration. (Accessed September 15, 2008, at http://www.eia.doe.gov/pub/international/iealf/table53.xls.)

SLOVAKIA

Slovakia was a modest regional producer of a variety of minerals. Aluminum and steel production formed the dominant elements of the country's metals sector. Steel production largely was based on imported raw materials and that of aluminum was based entirely on imported bauxite. Small quantities of copper, gold, lead, and zinc also were produced; the commercial deposits of these minerals have been virtually depleted. Industrial mineral production included that of barite, clays, magnesite, and salt. Slovakia's production of mineral fuels comprised brown coal and lignite and minor quantities of gas and petroleum (table 10).

Minerals in the National Economy

The economy of Slovakia continued to develop towards a full market system. The need to denationalize the state's commercial assets and to reduce subsidies to the public sector expeditiously was tempered by policies promulgated to maintain social stability that often resulted in increased public sector employment and uneven economic performance. In 2006, Slovakia's real gross domestic product (GDP) increased by 8.5%. The total value of industrial production in 2006 grew at a rate of 9.8% compared with that of 2005; the value of mining and quarrying declined by 9.7% and constituted 0.5% of the GDP in 2006 (Statistical Office of the Slovak Republic, 2007, p. 3, 5, 11).

Production

In 2006, Hydro Aluminum AS (Hydro) of Norway acquired a controlling 55.3% share of Slovalco A.S., which was Slovakia's sole producer of primary aluminum. In 2006, alumina output declined by about 1.2% compared with that of 2005; the production of primary aluminum during the same period increased by more than 13%. About 16% of total sales of aluminum metal was consumed domestically; the balance was exported. Italy and Poland were the major importers of Slovakia's aluminum. Slovalco reported the completion of modernization in the casthouse (Slovalco A.S., 2006, p. 25). Activities in the aluminum sector in 2006 included plans announced by Alcan Inc. of Canada to invest $35 million to build a new aluminum extrusion plant in Slovakia that would produce products for the construction sector. Completion of the extrusion plant was projected for the first half of 2007 (Metals Insider, 2006, p. 8).

Major activities in gold exploration continued to center on work undertaken by the Tournigan Gold Corp. of Canada at Kremnica. Tournigan's preliminary assessment of the deposit indicated resources at Kremnica to amount to 23.6 million metric tons of ore at an average grade of 1.37 grams per metric ton (g/t) gold and 11.36 g/t silver. The company indicated that

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a decision to commission a full feasibility study would be made before the end of 2008 (Tournigan Gold Corp., 2008, p. 9, 10).

Outlook

Slovakia is expected to continue to produce modest amounts of industrial minerals and mineral fuels. With the possible exception of gold, metal mining has practically ceased owing to depletion of economic reserves. Aluminum and ferrous metals will continue to be produced from imported ores and concentrates. The country will remain dependent on imports of energy carriers and metals for its industrial needs.

References Cited

Metals Insider, 2006, Alcan's Slovakian aluminium extruder to startup H1 2007: London, United Kingdom, Metals Insider, August 1, p. 8.

Slovalco A.S., 2006, Annual report 2005: Ziar nad Hronom, Slovakia, Slovalco A.S., 68 p.

Statistical Office of the Slovak Republic, 2007, Slovak Republic in figures 2007: Bratislava, Slovakia, Statistical Office of the Slovak Republic, 33 p.

Tournigan Gold Corp., 2008, Annual report, 2007: Vancouver, British Columbia, Canada, Tournigan Gold Corp., January 25, 32 p.

TABLE 1
CZECH REPUBLIC: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2002	2003	2004	2005	2006
METALS						
Aluminum, metal, secondary[e]		20,000	20,000	15,000	15,000	15,000
Copper, refined, secondary[e]		13,000	12,000	15,000	14,000	14,000
Gold, metal[e]	kilograms	-- [r]	-- [r]	-- [r]	-- [r]	--
Iron and steel, metal:						
Pig iron	thousand metric tons	4,840	5,200	5,385	4,562 [r]	5,131
Ferroalloys, total electric furnace[e]	do.	1	--	--	--	--
Steel, crude	do.	6,512	6,800	7,033	6,189 [r]	6,862
Semimanufactures, hot rolled	do.	5,489 [r]	7,338 [r]	6,947 [r]	5,423 [r]	5,500 [e]
Lead, metal, secondary[e]		25,000	26,000	25,000	25,000	26,100 [3]
Silver[e]		25	25	25	25	25
Uranium:						
Mine output, U content		477	458	435	420 [r]	383
Concentrate production, U content		465	452	412	409	358
Zinc, metal, secondary[e]		250	250	250	250	250
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand metric tons	3,217	3,465	3,709	3,978	3,900 [e]
Clays:						
Bentonite	do.	174	199	201	186 [r]	220
Kaolin	do.	3,650	4,155	3,862	3,882	3,768
Other	do.	564	554	649	671	561
Diamond, synthetic[e]	carats	5,000	5,000	5,000	5,000	5,000
Diatomite		28,000	41,000	33,000	38,000	53,000
Dolomite		314,000	416,000	345,000	419,000	409,000
Feldspar		401,000	421,000	488,000	472,000	487,000
Fertilizer materials:						
Nitrogenous, N content		250,000 [e]	251,000	271,000	270,000	270,000
Phosphatic, P_2O_5 content[e]		100,000	100,000	100,000	100,000	100,000
Potassic, K_2O content[e]		20,000	20,000	20,000	20,000	20,000
Mixed		75,000 [e]	36,000	30,000	30,000	30,000
Gemstones, crude, pyrope-bearing rock		52,000	53,000	42,000	43,000	39,000
Graphite		16,000	9,000	5,000	3,000	5,000
Gypsum and anhydrite, crude		108,000	104,000	71,000	25,000 [r]	16,000
Lime, hydrated and quicklime	thousand metric tons	1,120	1,251	1,264	1,223	1,200 [e]
Nitrogen, N content of ammonia[e]		215,000	235,000	250,000	250,000	250,000
Sand and gravel:						
Common sand and gravel	thousand cubic meters	8,268 [r]	9,109 [r]	8,664 [r]	9,080 [r]	9,130
Foundry sand	thousand metric tons	476	714	831	807	773
Glass sand	do.	853	904	829	920	963

See footnotes at end of table.

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TABLE 1—Continued
CZECH REPUBLIC: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2002	2003	2004	2005	2006
INDUSTRIAL MINERALS--Continued						
Stone:						
Basalt, for casting		14,000	13,000	12,000	12,000 e	10,000 e
Dimension stone	thousand cubic meters	285,000	244,000	273,000	288,000	293,000
Limestone and other calcareous stones	thousand metric tons	10,186	10,236	10,568	10,190 r	10,441
Building stone	thousand cubic meters	10,600	12,459	13,177	14,092 r	14,000 e
Sulfur, byproduct, all sources[e]		40,000	45,000	45,000	45,000	45,000
Sulfuric acid		240,524	239,000	234,000	230,000	230,000
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Bituminous	thousand metric tons	14,097	13,382	14,648	12,728	13,017
Brown and lignite	do.	49,335	50,390	48,290	49,125	49,374
Coke	do.	3,536	3,556	3,538	3,500	3,500
Fuel briquets from brown coal	do.	302	314	300	300 e	300 e
Gas:						
Manufactured, all types[e]	million cubic meters	800	800	800	800	800
Natural, marketed[4]	do.	91	131	175	356	148
Petroleum:						
Crude:						
As reported	thousand metric tons	253	310	299	306	259
Converted	thousand 42-gallon barrels	1,620 e	1,984	1,880 e	1,920	1,600
Refinery products[e]	do.	35,000	35,000	35,000	35,000	35,000

[e]Estimated; estimated data are rounded to no more than three significant digits. [r]Revised. -- Zero.
[1]Table includes data available through November 2007.
[2]In addition to the commodities listed, arsenic, dolomite, illite, sodium compounds, talc, and zeolite are produced, but available information is inadequate make reliable estimates of output.
[3]Reported figure.
[4]Includes gas produced from coal mines. Gross output of natural gas is not reported but is believed to exceed reported marketed output by an inconsequential amount.

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TABLE 2
CZECH REPUBLIC: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities[1]	Annual capacity
Aluminum, secondary		Alcan Decin Extrusions s.r.o.	Decin, northern Bohemia	40,000
do.		Kovohute Mnisek a.s.	Mnisek	70,000
Bentonite		Keramost a.s.	Most	250
Cement		Ceskomoravsky Cement a.s.	Kraluv dvur	350
Do.		Heidelberger Cement, 82.8%	Mokra	1,400
Do.		do.	Radotin	750
Do.		Cizkovicka Cementarna a.s. (Lafarge Group, 85%)	Cizkovicka	980
Do.		Holcim (Cesko) a.s.	Prague	1,000
Do.		Cement Hranice a.s. (Dyckerhoff, 98%)	Hranice	850
Do.		Cemos Ostrava a.s. (Cement Hranice, 95%)	Ostrava	400
Clay		Ceske Lupkove Zavody a.s.	Nove Straseci (refactory clay)	120
Do.		Chlumcanske Keranicke Zavody a.s.	Chlumcany (kaolin)	30
Do.		Kaolin Hlubany a.s. (WBB Minerals, 94%)	Podborany	100
Coal:				
Bituminous		OKD a.s. Ostrava	Ostrava-Karvina, north Moravia	20,000
Brown		Severoceske Doly a.s.	Chomutov	14,000
Do.		Mostecka Uhelna Spolecnost a.s.	Most	17,000
Do.		Sokolovska Uhelna a.s.	Sokolov	30,000
Lignite		Lignit Hodonin s.r.o.	Hodonin, south Moravia	1,000
Gold		Kovohute Pribram Nastupickna a.s.	Pribram	9
Graphite		Grafitove doly Stare Mesto s.r.o.	Stare Mesto	10
Lead, metal, secondary, refined		Kovohute Pribram Nastupickna a.s.	Pribram	29
Natural gas	million cubic meters	Gasfields in Brno and Ostrava regions, of which:	Eastern/southeastern Czech Republic	500 [2]
		Ceska Naftarska Spol s.r.o.	Hodonin	
		Moravske Naftove Doly a.s.	do.	
		OKD Dulni Pruzkum a Bezpecnost a.s.	Paskov	
		UNIGEO a.s.	Ostrava-Hrabova	
Petroleum:				
Crude		Oilfields around Hodonin, of which:		160 [2]
		Moravske Naftove Doly a.s.	Hodonin	
		Ceska Naftarska Spol s.r.o.	do.	
		UNIMASTER s.r.o	do.	
Refinery	thousand 42-gallon barrels per day	Kolin, Kralupy, Pardubice, and Litvinov	Bohemia	200
Steel, crude		Nova Hut s.p. (Mittal Steel Ostrava)	Kunice-Ostrava	3,800
Do.		Zelezarne Vitkovice (ZV) (Evraz Group)	Vitkovice-Ostrava	900
Do.		Trinecke Zelezarny (Trinecke Iron and Steel Works)	Trinec	3,000
Do.		Poldi Hutte s.r.o. (Scholz Edelstahl A.G.)	Kladno-Prague	1,700
Do.		Zelezarny Bila Cerkev	Hradek-Rokycany	300
Do.		Zelezarny Veseli, a.s.	Veseli and Moravou	300
Do.		Zelezarny Chomutov s.p.	Chomutov	350
Do.		Bohumin Iron and Steel Works	Bohumin	400
Titanium dioxide		Precheza A.S	Precheza	25
Uranium		DIAMO s.p.	Straz pod Ralskem	2

[1]Names and locations of mines and crude oil refineries are identical.
[2]Annual capacity listed is total for all deposits, mines, or companies that produce the commodity.

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TABLE 3
HUNGARY: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2002	2003[e]	2004	2005	2006
METALS						
Aluminum:						
Bauxite, gross weight	thousand metric tons	720	666 [3]	647	535	538
Alumina, gross weight, calcined basis	do.	220 [e]	300	300	270	270
Metal:						
Primary		35,000 [e]	34,000	34,400	31,000	34,400
Secondary[e]		75,000	50,000 [3]	50,000	50,000	50,000
Total		110,000 [e]	84,000	84,400	81,000	84,400
Copper, metal, refined including secondary[e]		10,000	10,000	10,000	10,000	10,000
Gallium		5,400	5,500 [3]	5,500	5,500	5,500 [3]
Iron and steel, metal:						
Pig iron	thousand metric tons	1,334	1,333 [3]	1,350	1,329	1,335
Ferroalloys[e, 4]		1,900	8,000	8,000	8,000	8,000
Steel:						
Crude	thousand metric tons	2,141	1,983 [3]	1,957	1,962	2,029
Semimanufactures, rolled only[e]	do.	1,900	1,803 [3]	1,844 [3]	1,850	1,800
Manganese ore:						
Run-of-mine:						
Gross weight		49,000 [e]	48,000 [3]	49,000	50,000	50,000 [3]
Mn content[e]		12,700	12,500	13,200	13,500	13,500
Concentrate:[e]						
Gross weight		15,000	15,000	15,000	15,000	15,000
Mn content		5,000	5,000	5,000	5,000	5,000
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand metric tons	3,510	3,573 [3]	3,580	3,349	3,349
Clays:						
Bentonite:						
Raw		3,700	87,029 [3]	9,280	9,000	6,600
Processed[e]		1,400	42,000	3,700 [3]	3,700	2,500
Kaolin, raw and washed		4,300	13,250 [3]	7,530	7,000	7,000
Gypsum and anhydrite[e]		72,200	62,000	55,000 [3]	55,000	30,000 [3]
Lime, calcined[e]	thousand metric tons	500	500	500	500	500
Nitrogen, N content of ammonia[e]	do.	238	232 [3]	274 [3]	275	275
Perlite		140,000	59,530 [3]	65,100	65,000	71,000
Sand and gravel:						
Gravel	thousand metric tons	29,138	35,000	33,544	33,500	34,483
Sand:						
Common[e]	do.	12,000 [r]	12,000 [r]	12,500 [r]	12,800 [r]	11,634 [3]
Foundry		152,000	162,600 [3]	138,200	138,000	120,000
Glass		317,000	225,300 [3]	163,900	164,000	251,000
Stone:						
Dimension, all types[e]	thousand metric tons	5,626 [3]	5,500	5,000	5,000	5,000
Dolomite	do.	4,196	4,398 [3]	7,200	7,200 [e]	7,933
Limestone	do.	7,152	2,459 [3]	3,014	3,014	3,257
Sulfur, byproduct, elemental, all sources[e]		52,000	51,000	50,000	50,000	50,000
Sulfuric acid[e]		80,000	80,000	80,000	80,000	80,000
Talc[e]		500	--	--	80,000 [r]	80,000
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Bituminous	thousand metric tons	660	667 [3]	260	--	--
Brown	do.	4,570	4,128 [3]	2,495	1,426	1,431
Lignite	do.	7,574	8,564 [3]	8,470	8,154	8,467
Total	do.	12,804	13,359 [3]	11,225	9,580	9,898
Coke, metallurgical[e]		650	650	650	650	650
Gas, natural, marketed	thousand cubic meters	3,353	3,010 [3]	3,200	3,159	3,246
Peat, agricultural use[e]		150	200 [3]	200	200	200

See footnotes at end of table.

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TABLE 3—Continued
HUNGARY: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2002	2003[e]	2004	2005	2006
MINERAL FUELS AND RELATED MATERIALS—Continued						
Petroleum:						
Crude:						
As reported	thousand metric tons	1,050	1,133 [3]	1,100	948	886
Converted	thousand 42-gallon barrels	8,011	8,640	8,400 [e]	7,200	6,800
Refinery products[e, 5]	do.	40,000	40,000	40,000	40,000	40,000

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. -- Zero.

[1]Table includes data available through November 2007.

[2]In addition to the commodities listed, diatomite and a variety of industrial minerals and construction materials, such as common clay, are also produced, but available information is inadequate to make reliable estimates of output.

[3]Reported figure.

[4]Hungary is believed to produce some blast ferromanganese.

[5]Excludes refinery fuel and losses.

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TABLE 4
HUNGARY: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities	Annual capacity
Alumina		Magyar Aluminium Ltd. (MAL)	Ajka Timfoldgyar plant, about 120 kilometers southwest of Budapest, near Lake Balaton	400
Do.		do.	Almasfuzito Timfoldgyar plant near the Czech Republic border, 63 kilometers northwest of Budapest	240
Do.		do.	Moson-Magyarovar plant, in northwestern corner of Hungary, about 12 kilometers from Austrian and Czechoslovak borders	30
Aluminum, primary		do.	Inota plant, near Varpalota, 75 kilometers southwest of Budapest	46
Bauxite		Magyar Aluminium Ltd. (MAL) (owns and operates Bakony Bauxite Mines Ltd.)	Bakony District, extending roughly 100 kilometers northeast along Lake Balaton	1,500
Cement		Belpafatvalvi Cement es Meszipari Rt [Heidelberger & Schwenk (Germany) and Hungarian Group]	Belapatfalva, near Miskolc, 125 kilometers northeast of Budapest	1,100
Do.		Beremend Cement es Meszipari Rt [Heidelberger & Schwenk (Germany), 100%]	Beremend, 45 kilometers south of Pecs	1,090
Do.		Dunai Cement es Meszmu Kft [Heidelberger & Schwenk (Germany), 100%]	Vac, 50 kilometers north of Budapest	1,200
Do.		Hejocsabai Cement es Meszipari Rt [Holderbank (Germany) and Hungarian Group]	Hejoscaba, 150 kilometers northeast of Budapest	1,450
Do.		Labatlani Cementipari kft [Holderbank (Germany), 100%]	Labatlan, 20 kilometers north of Tatabanya	550
Clays		Agyag-Asvany Kft [Navan Resources PLC (Ireland)]	Felsopeteny, one underground and two open pit mines and a 5,000-metric-ton-per-year processing plant. Products are ball clay, kaolin, and refractory clay	35
Coal:				
Bituminous and lignite		Magyar Szenbanyaszati Troszt (MSZT) (Hungarian Coal Mining Trust)	Tatabanya and Oroszlany coal mining region, 45 kilometers west of Budapest	8,900
Do.		do.	Mecsek coal mining region, near Pecs and Komlo, north of the Yugoslav border	3,100
Do.		do.	Borsod coal mining region, 130 kilometers northeast of Budapest	5,200
Lignite		do.	Thorez opencast mine at Visonta, 80 kilometers northeast of Budapest	7,000
Manganese		Orszagos Erc-es Asvanybanyak (National Ore and Mineral Mines)	Urkut manganese ore mines, 120 kilometers southwest of Budapest	160
Natural gas	million cubic feet	Hungarian Oil and Gas Co. (MOL)	Szeged and Algyo gasfields, southern Hungary	152,000
Do.		do.	Hajduszoboszo gasfields, 180 kilometers east of Budapest	50,000
Do.		do.	Smaller gasfields are Szank, Kardoskut, Bekes, Berefurdo, and others	39,000
Perlite		Perlit 92 Kft [Navan Resources PLC (Ireland) and Hungarian Group]	Palhaza, northeastern Hungary; open pit mine and processing plant	150
Petroleum:				
Crude	million 42-gallon barrels	Hungarian Oil and Gas Co. (MOL)	Szeged-Algyo Field, near Romanian-Yugoslav border; 50% of total capacity	7
Refined		Subsidiaries of Hungarian Oil and Gas Co. (MOL), of which:		
Do.	do.	Danube Petroleum Refining Co.	Szazhalombatta	55
Do.	do.	Tisza Petroleum Refining Co.	Leninavaros	22
Do.	do.	Zala Petroleum Refining Co.	Zalaegerszeg	4
Silica		Uveg-Asvany Kft. [Navan Resources PLC (Ireland) and Hungarian Group]	Mine and plant at Fehevaresugo	660
Steel		Dunaferr Dunai Vasmu Rt	60 kilometers south of Budapest	1,400
Do.		OAM-Ozdi Acelmuvek Kft	120 kilometers northeast of Budapest	360
Do.		DAM-Diosgyori Acelmuvek es Kereskedelmi Kft	Diosgyoer, 145 kilometers northeast of Budapest	850

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TABLE 5
POLAND: PRODUCTION OF MINERAL COMMODITIES[1]

(Thousand metric tons unless otherwise specified)

Commodity[2]		2002	2003	2004	2005	2006
METALS						
Aluminum, metal:						
Primary	metric tons	49,125	45,371	45,807	54,508	57,620
Secondary[e]	do.	9,700 [3]	11,900	12,000	12,000	12,000
Total[e]	do.	58,825 [3]	57,300	57,800	66,500	69,600
Cadmium, metal, primary	do.	440	375	356	408	400
Copper:						
Ore:						
Gross weight		29,705	29,992	31,800	32,019	34,821
Cu content	metric tons	568,000	570,000 [e]	590,000	614,800	670,000
Concentrate:						
Gross weight		1,935	1,756	2,054	1,977 [r]	2,100
Cu content	metric tons	503,000	474,000	554,000	533,000 [r]	570,000
Metal:						
Smelter:						
Primary	do.	510,700	515,000 [e]	541,000	552,200	558,200
Secondary[e]	do.	29,400	28,500 [e]	30,000	25,000	20,000
Total	do.	540,100	543,500	571,000	577,200	578,200
Refined, electrolytically, primary and secondary	do.	508,674	529,616	550,066	560,256	556,625
Gold, mine output, Au content	kilograms	296	356	527	530	500
Iron and steel:						
Pig iron:						
For foundry use[e]		52 [3]	132	200	200	200
For steel production		5,245	5,500 [e]	6,200	4,477	5,333
Total		5,297	5,632	6,400	4,677	5,533
Ferroalloys:						
Blast furnace, ferromanganese	metric tons	600	1,000 [e]	46,900 [r]	45,000 [r,e]	40,000
Electric furnace:						
Ferrochromium	do.	100	200	-- [r]	-- [r]	--
Ferrosilicomanganese	do.	7,500	5,000 [r]	29,600 [r]	25,000 [r,e]	25,000 [e]
Ferrosilicon	do.	41,800	92,700 [r,e]	83,500 [r]	80,000	80,000
Total	do.	50,000 [r]	98,900 [r,e]	160,000 [r]	150,000 [r]	145,000
Steel, crude:						
From open hearth furnaces		169	--	--	--	--
From oxygen converters		5,531	6,070	6,865	4,927	5,755
From electric furnaces		2,667	3,040	3,713	3,409	4,237
Total		8,367	9,110	10,578	8,336	9,992
Semimanufactures:						
Hot rolled		6,372 [r]	6,720 [r]	7,605 [r]	6,294 [r]	7,666
Cold rolled		1,349	1,533	1,600	1,600	1,600
Pipe		309	309	310	380	417
Lead:						
Mine output:						
Pb content of Pb-Zn ore	do.	73,500	74,000	51,000	78,000	63,300
Pb content of Cu ore	do.	46,900	36,000	36,000	37,800	30,700
Total	do.	120,400	110,000	87,000	115,800	94,000
Concentrate:						
Gross weight	do.	85,000	100,200	110,200	110,000 [e]	110,000 [e]
Pb content	do.	56,600	54,700	60,200	60,000 [e]	60,000 [e]
Metal:						
Smelter:[e]						
Primary	do.	29,400 [3]	25,000	25,000	20,000	20,000
Secondary	do.	44,700 [3]	45,000	45,000	45,000	45,000
Total	do.	74,100 [3]	70,000	70,000	65,000	65,000
Refined, primary and secondary	do.	65,800	55,563	55,932 [r]	62,455 [r]	67,298

See footnotes at end of table.

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TABLE 5—Continued
POLAND: PRODUCTION OF MINERAL COMMODITIES[1]

(Thousand metric tons unless otherwise specified)

Commodity[2]		2002	2003	2004	2005	2006
METALS—Continued						
Platinum-group metals, average content of slimes:[e, 4, 5]						
Palladium	kilograms	12	10 [e]	10	10	10
Platinum	do.	20	20 [e]	20	20	20
Selenium	metric tons	68	78	83	83	83
Silver, mine output, Ag content	do.	1,222	1,237	1,344	1,306 [r]	1,300
Zinc:						
Zn content:						
Mine output	do.	171,200	174,700	170,000 [r, e]	150,000	160,000
Concentrate output	do.	152,200	153,900	140,300 [r]	117,200	126,000
Metal, refined, including secondary	do.	158,900	154,200	131,000 [r]	137,300 [r]	134,000
INDUSTRIAL MINERALS						
Barite, beneficiated	do.	2,700	3,030	3,183	2,357	2,143
Cement:						
Clinker		8,812	8,525	9,600 [r, e]	9,500 [r]	11,000
Hydraulic		10,948	11,653	12,837	12,646	14,688
Portland		10,000	10,700	11,700 [r, e]	11,400 [r]	13,200 [e]
Clays and clay products, crude:						
Bentonite	metric tons	26,200	31,648	66,143	86,331	93,880
Fuller's earth	do.	26,200	4,200 [r]	4,700 [r]	5,000 [r, e]	5,000 [e]
Fire clay		128	144	137	156	187
Kaolin:						
Crude		252	170	191	214	200
Beneficiated		114	136	191	115	110
Diatomite	metric tons	1,000	700	1,000 [e]	1,000 [e]	1,000 [e]
Feldspar:						
Run of mine	do.	219,000 [r]	289,000 [r]	336,900 [r]	350,000 [r]	350,000
Processed, including imported material	do.	293,000	334,000 [r]	408,900 [r]	400,000 [r]	400,000
Gypsum and anhydrite:						
Natural:[6]						
Gypsum rock		867	1,031	971 [r]	1,000	1,100
Anhydrite		280	297	301 [r]	243	262
Total		1,147	1,328	1,272 [r]	1,243	1,362
Synthetic gypsum		1,134 [r]	1,094 [r]	1,250 [r]	1,000 [e]	1,000 [e]
Grand total		2,281 [r]	2,422 [r]	2,522 [r]	2,243	2,362
Lime, hydrated and quicklime		1,865	1,955	2,086 [r]	1,688	1,700
Magnesite:[e]						
Ore, crude	metric tons	24,000 [3]	30,000 [r]	52,000 [r]	50,000 [r]	50,000
Concentrate	do.	22,100 [3]	27,200 [r]	57,900 [r]	50,000 [r]	50,000
Calcined	do.	100 [3]	100	100	100	100
Nitrogen, N content of ammonia		1,362	1,912	1,985	1,985	2,100
Salt:						
Rock		839	848	1,099	1,123	1,130
Other		2,719	3,812	4,043	3,762	3,825
Total		3,558	4,660	5,142	4,885	4,955
Sand, excluding glass sand:						
Aggregates:						
Mine output	metric tons	66,722	78,945 [r]	81,398 [r]	80,000 [r]	80,000 [e]
Processed	do.	62,799	71,376 [r]	73,028 [r]	70,000 [r]	70,000 [e]
Foundry sand		628	666 [r]	606 [r]	650 [e]	650 [e]
Filling sand		6,553 [r]	5,843 [r]	5,945 [r]	6,000 [r]	6,000 [e]
Lime-sand brick production sand	thousand cubic meters	411	483 [r]	540 [r]	500 [r]	500 [e]
Silica:						
Glass:						
Construction, flat		550 [r]	644 [r]	696 [r]	650 [r]	650 [e]
Technical		53 [r]	53 [r]	69 [r]	70 [r]	70 [e]

See footnotes at end of table.

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TABLE 5—Continued
POLAND: PRODUCTION OF MINERAL COMMODITIES[1]

(Thousand metric tons unless otherwise specified)

Commodity[2]		2002	2003	2004	2005	2006
INDUSTRIAL MINERALS—Continued						
Silica—Continued:						
Glass—Continued:						
Commercial		83 r	89 r	98 r	100 r	100 e
Packing		970 r	968 r	1,108 r	1,000 r	1,000 e
Silica ores:						
Glass sand, marketable		1,235	1,402	1,479 r	1,500 e	1,500 e
Quartz and quartz crystal, marketable	metric tons	27,000	32,800 r	37,100 r	35,000 e	35,000 e
Quartzite, refractory, marketable	do.	32,000	115,400	108,000 r	100,000 r	100,000 e
Quartz schist, marketable	do.	3,000	2,800	9,000 r	9,000 r	9,000 e
Sodium compounds, n.e.s.:						
Carbonate (soda ash), 98%		1,054	1,050	1,167	1,189	1,177
Caustic soda (96% NaOH)		395	427	452	391 r	462
Stone, mine output:						
Dimension stone		1,074 r	2,052 r	2,282 r	2,300 r	2,300 e
Dolomite		1,585	1,815	1,986	1,834	2,013
Limestone:						
For lime production		10,306	11,379 r	11,000 r	10,000 e	10,000 e
For non-lime end use		23,233	23,747	23,233 r	24,607	29,299
Road stone		269	172	155	150	150 e
Sulfur:						
Native, Frasch		760	762	821	802	800
Byproduct:						
From metallurgy		275	275 e	275 e	275 e	275 e
From petroleum		180	175 e	175 e	175 e	175 e
Total		455	450 e	450 e	450 e	450 e
From gypsum[6]		10	10	10	10 e	10 e
Grand total		1,225	1,222	1,281	1,262	1,260
MINERAL FUELS AND RELATED MATERIALS						
Carbon black		16,900	18,500 r	36,400 r	35,000 r	35,000 e
Coal:						
Bituminous		103,546	103,016	101,230	97,903	95,220
Lignite and brown		58,210	60,919	61,197	61,136	60,844
Total		161,756	163,935	162,427	159,039	156,064
Coke, coke oven		8,787	10,111	7,752	8,518 r	9,735
Fuel briquets, all grades		50 e	4	3	3	3
Gas:						
Natural	million cubic meters	5,259	5,315	5,630 r	5,742	5,650
Manufactured:						
Town gas	do.	6 e	4	5	11 r	10
Coke oven gas	do.	3,752	4,245	4,216	3,545 r	4,101
Generator gas[e]	do.	300	300	300	300	300
Total	do.	4,058	4,549	4,521	3,856 r	4,400 e
Peat, fuel and agricultural		300 e	430	509	500 e	500 e
Petroleum:						
Crude, as reported		721	765	886	849	797
Refinery products		17,540	16,886	17,000 e	16,000	16,000

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. -- Zero.

[1]Table includes data available through November 2007.

[2]In addition to the commodities listed, antimony and germanium, which are associated with polymetallic deposits, and cobalt and nickel, which are associated with copper ores, are produced in quantities that so far have not warranted further recovery.

[3]Reported figure.

[4]Based on official Polish estimates.

[5]Estimates based on reported platinum- and palladium-bearing final (residual) slimes and their average Pt and Pd content from electrolytic copper refining.

[6]Includes building gypsum, as well as an estimate for gypsum used in the production of cement.

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TABLE 6
POLAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1]

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity
Aluminum:			
Primary	Aluminium Konin-Impexmetal S.A.	Konin	55.
Secondary	Zaklady Metalurgiczne "Skawina"	Skawina	20.
Do.	Zaklady Metali Lekkich SA "Kety"	Kety	NA.
Do.	Zaklady Metalurgiezne "Trzebinia"	Trzebinia	NA.
Barite[2]	Przedsiebiorstvo Hondlowo Uslugowe R&S Spolka Jawna	Boguszow, Stanislawow	3.
Cement:			
Do.	Zaklady Cementowo-Wapiennicze Gorazdze S.A.	Chorula	1,800 clinker, 2,400 cement.
Do.	Cementownia "Ozarow" S.A.	Ozarow	2,200 clinker, 2,400 cement.
Do.	Cementownia "Chelm" S.A.	Chelm	1,440 clinker, 2,640 cement.
Do.	Kombinat Cementowo-Wapienniczy Warta S.A.	Dzialoszyn	600 clinker, 1,150 cement.
Do.	Cementownia "Malogoszcz" S.A.	Malogoszcz	1,840 clinker, 1,800 cement.
Do.	Zaklady Cementowo-Wapiennicze Nowiny S.A.	Sitkowka	785 clinker, 1,070 cement.
Do.	Cementownia "Strzelce Opolskie" S.A.	Strzelce Opolskie	1,257 clinker, 1,630 cement.
Do.	Kombinat Cementowo-Wapienniczy "Kujawy" S.A.	Bielawy	900 clinker, 1,000 cement.
Do.	Cementownia "Rudniki" S.A.	Rudniki	840 clinker, 1,470 cement.
Do.	Cementownia "Wierzbica" S.A.	Wierzbica	759 clinker, 1,000 cement.
Do.	Cementownia "Nowa Huta" S.A.	Krakow	290 clinker, 1,100 cement.
Do.	Cementownia "Rejowiec" S.A.	Rejowiec	600 clinker, 845 cement.
Do.	Cementownia "Odra" S.A.	Opole	433 clinker, 800 cement.
Do.	Cementownia "Warszawa"	Warszawa (Warsaw)	600 cement.
Do.	Cementownia "Groszowice" Sp. z.o.o.	Opole	304 clinker, 425 cement.
Do.	Cementownia "Polcement-Saturn"	Wojkowice	400 cement.
Do.	Cementownia "Wiek"	Ogrodzieniec	710 clinker, 240 cement.
Do.	Fabrika Cementu "Wysoka"	Lazy	304 clinker, 425 cement.
Do.	Cementownia "Wejhorowie"	Wejhorowo	42 clinker, 45 cement.
Coal:			
Anthracite	Zaklad Wydobywczo Przetworczy Antracytu Walbrzych-Gaj	Lower Silesia	200.
Bituminous	Includes:	Of which:	140,000.[3]
	Bytomska Spolka Weglowa S.A.	Upper Silesia (9 mines)	
	Rudzka Spolka Weglowa S.A.	do. (6 mines)	
	Gliwicka Spolka Weglowa S.A.	do. (7 mines)	
	Katowicki Holding Weglowy S.A.	do. (11 mines)	
	Nadwislanska Spolka Weglowa S.A.	do. (8 mines)	
	Rybnicka Spolka Weglowa S.A.	do. (5 mines)	
	Jastrzebska Spolka Weglowa S.A.	do. (6 mines)	
	Seven independent mines	do.	
	Walbrzyskie Kopalnie Wegla Kamiennego	Lower Silesia	
	KWK "Nowa Ruda"	do.	
	KWK "Bogdanka" S.A.	do.	

See footnotes at end of table.

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TABLE 6—Continued
POLAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1]

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity
Coal—Continued:			
Lignite	Includes:	Of which:	75,000.[3]
	KWK "Belchatow"	Belchatow	
	KWK "Turow"	Turow	
	KWK "Konin"	Konin	
	KWK "Adamow"	Adamow	
	KWK "Sieniawa"	Sieniawa	
Coke	Includes:	Of which:	12,000.[3]
	Zaklady Koksownicze im. Powstancow Sl.	Upper Silesia	
	Zaklady Koksownicze "Przyjazn"	do.	
	Kombinat Koksochemiczny "Zabrze"	do.	
	Huta im. Sendzimira	do. (Krakow)	
	Huta "Czestochowa"	do. (Czestochowa)	
	Zaklady Koksownicze "Walbrzych"	Lower Silesia	
Copper:			
Ore, gross weight (1.2%–2.2% Cu)	Kombinat Gorniczo Hutniczy Miedzi (KGHM) Polska Miedz S.A. (KGHM, S.A.)	Lubin Mine, Lubin-Glogow District	7,000.
Do.	do.	Polkowice-Sieroszowice Mine, Lubin-Glogow District	9,200.
Do.	do.	Rudna Mine, Lubin-Glogow District	11,000.
Concentrate, gross weight (25.2% –25.9% Cu)	do.	Lubin beneficiation plant, Lubin-Glogow District	465.
Do.	do.	Polkowice beneficiation plant, Lubin-Glogow District	450.
Do.	do.	Rudna beneficiation plant, Lubin-Glogow District	700.
Metal, refined	do.	Refineries at Glogow I, Glogow II, and Legnica	480.
Feldspar	Strzeblowskie Kopalnie Surowcow Mineralnych	Mine at Sobotka, Lower Silesia, workings at Pagorki Zachodnie and Pagorki Wschodnie	50.
Ferroalloys:			
Electric furnace (FeSiMn, FeMn, FeCr, FeSi)	Huta "Laziska" S.A.	Upper Silesia at Laziska Gome	170.
Blast furnace (FeMn)	Huta "Pokoj" S.A.	Upper Silesia, Ruda Slaska	90.
Gold kilograms	KGHM "Polska Miedz" S.A.	Refinery at Glogow "Trzebinia"	550.
Gypsum and anhydrite	Includes:	Of which:	1,400.[3]
	Zaklady Przemyslu Gipsowego "Dolina Nidy"	Southeastern Poland, Gacki	
	Zaklad Gipsowy "Stawiany"	Southeastern Poland, Szarbkow	
	Kopalnia Anhydrytu "Nowy Lad"	Lower Silesia, Niwnice	
	KGHM "Polska Miedz" S.A.	Lower Silesia, Iwiny	
Helium million cubic meters	Zaklad Odazotowania Gazu	Western Poland, Odolanow	3.
Kaolin	KSM "Surmin-Kaolin" S.A.	Lower Silesia, Nowogrodziec	50.
Lead-zinc:			
Concentrate	Zaklady Gorniczo-Hutnicze (ZGH) "Boleslaw"	Mines and concentrators at Olkusz and Pomorzany, Bukowno region	60 lead, 160 zinc.
Metal:			
Pb, refined	Huta Cynku "Miasteczko Slaskie"	Refinery at Miasteczko Slaskie	60.
Do.	Huta Metali Niezelaznych "Szopienice"	Katowice	35.
Zn, refined	Huta Cynku "Miasteczko Slaskie"	Imperial Smelter at Miasteczko Slaskie	60.
Do.	Zaklady Metalurgiczny "Silesia" (input from Huta "Miasteczko Slaskie")	Refinery at Katowice	30.
Do.	Zaklady Gorniczo-Hutnicze "Boleslaw"	Refinery at Boleslaw	65.
Do.	Huta Metali Niezelaznych "Szopienice"	Katowice	28.

See footnotes at end of table.

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TABLE 6—Continued
POLAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1]

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities	Annual capacity
Lime[4]		Zaklady Przemyslu Wapienniczego Trzuskawica	Kieleckie County, Swietokrzyskie Mountains	4,500.[3]
		Slaskie Zaklady Przemyslu Wapienniczego Opolwap S.A.	Opole County	
		Zaklady Przemyslu Wapienniczego Bukowa	Kieleckie County, Swietokrzyskie Mountains	
		Kombinat Cementowo-Wapienniczy Kujawy S.A.	Bydgoskie County	
		Zaklady Cementowo-Wapiennicze Gorazdze S.A.	Opole County	
		Zaklady Cementowo-Wapiennicze Nowiny	Kieleckie County	
		Produkcyjno-Handlowo-Uslugowe Wapmo-Sabinow	Czestochowa County	
		Wojcieszowskie Zaklady Przemyslu Wapienniczego Sp. z.o.o.	Jeleniogorskie County	
		Zaklady Przemyslu Wapienniczego w Sulejowie	Piotrkowskie County	
		Zaklad Wapienniczy w Plazie	Katowickie County	
Natural gas	million cubic meters	Ministry of Mining and Energy	Gasfields at pre-Carpathian foothills; Carpathian Mountains Lowlands, near Ostrow Wielkopolski, Poznan, and Trzebnica, north of Wroclaw	4,900.
Nitrogen:				
Ammonia (NH_3)		Includes:	Of which:	2,400.[3]
		Zaklady Azotowe "Pulawy" S.A.	Pulawy in eastern Poland	
		Zaklady Azotowe "Kedzierzyn" S.A.	Kedzierzyn in Upper Silesia	
		Zaklady Azotowe "Wloclawek" S.A.	Wloclawek in central Poland	
		Zaklady Azotowe S.A. w Tarnowie	Tarnow in southern Poland	
		Zaklady Azotowe S.A. w Chorzowie	Chorzow in Upper Silesia	
		Zaklady Chemiezne "Police"	Police in northwest Poland	
Fertilizer (N)		do.	do.	1,700.
Petroleum:				
Crude		Includes:	Of which:	200.[3]
		Polskie Gornictwo Naftowe i Gazownictwo Warszawa	Oilfields in northern and northwestern lowlands; sub-Carpathian region and Carpathian Mountains	
		Predsiebiorstwo Poszukiwan i Eksploatacji Rpy i Gazu "Petrobaltic"	do.	
Do.			Baltic Sea Shelf	100.
Refined		Includes:	Of which:	13,500[3]
		Petrochimia-Plock	Plock in central Poland	
		Rafineria "Gdansk"	Gdansk in northern Poland	
		Rafineria "Chechowice"	Czechowice in southern Poland	
		Rafineria "Trzebinia"	Trzebinia in southern Poland	
		Rafineria "Glimar" Gorilice	Gorilice in southern Poland	
		Rafineria "Jedlicze"	Jedlicze in southern Poland	
		Podkarpackie Zaklady Rafyneryjne w Jasle	Jaslo in southern Poland	
Salt, all types		Includes:	Of which:	6,500.[3]
		Inowroclawskie Kopalnie Soli S.A.	Gora, Mogilno I, and Mogilno II Mines at Inowroclaw in central Poland	
		Kopalnia Soli "Klodawa"	Klodawa in central Poland	
		Kopalnia Soli "Wieliczka"	Wieliczka in southern Poland, near Krakow, mining deposits at Barycz and Wieliczka	
		Kopalnia Soli "Bochnia"	Southern Poland, mines at the Lezkowice and Siedlec-Moszczenica-Lapczyca deposit. Not known to have operated in 1999	
		KGHM "Polska Miedz" S.A.	Sieroszowice in southwestern Poland	
		Kopalnia Wegla Kamiennego "Debiensko"	Debiensko, Upper Silesia	
		Janikowskie Zaklady Sodowe "Janikosoda" S.A.	Janikowo in central Poland	

See footnotes at end of table.

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TABLE 6—Continued
POLAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1]

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity
Selenium	Includes:	Of which:	80.[3]
	Huta Metali Niezelaznych 'Szopienice"	Katowice	
	KGHM "Polska Miedz" S.A.	Refinery at Glogow	
Silver	KGHM "Polska Miedz" S.A. and	Refined from dore produced by the	1.[3]
	Zaklady Metalurgiczne Trzebinia	Szopienice Pn-Zn smelter-refinery	
		largely from KGHM-supplied slimes	
Steel:			
Crude and semimanufactures	Includes:	Of which:	14,000 (crude).[3]
	Huta Katowice S.A.	Plant at Dobrowa Gornicza, producing pig iron, crude steel, hot-rolled products, and cast steel	
	Huta im. T. Sendzimir S.A.	Steelworks at Krakow, producing pig iron, crude steel, hot-rolled products, cold-rolled products, pipes, and cast iron	
	P.P. Huta "Zawierciu"	Steelworks at Zawierciu, producing crude steel, hot-rolled products, cast iron, and cast steel	
	Huta Czestochowa S.A.	Steelworks at Czestochowa, producing pig iron, crude steel, hot-rolled sheets, pipes, and cast iron	
	Huta "Ostrowiec" S.A.	Steelworks at Ostrowiec-Swietokrzyski, producing crude steel, and hot-rolled products	
	P.P. Huta "Labedy"	Steelworks at Gliwice, producing crude steel and hot-rolled products	
	Huta "Lucchini-Warszawa" Sp. z o.o.	Steelworks in Warsaw, producing crude steel, hot-rolled products, and cold-rolled strip	
	Huta Florian S.A.	Steelworks in Swietochlowicach, producing crude steel, hot-rolled products, galvanized sheet, and cold-rolled strip	
	Huta "Stalowa Wola" S.A.	Steelworks at Stalowa Wola, producing crude steel	
	Huta "Jednosc" S.A	Steelworks at Siemianowice Slaskie, producing crude steel, hot-rolled products, and pipes	
	Huta "Batory" S.A.	Steelworks at Chorzow, producing crude steel, hot-rolled products, and pipes	
	P.P. Huta "Baildon"	Steelworks in Katowice, producing crude steel, hot-rolled products, cold-rolled strip, and cast steel	
	Huta "Malapanew" S.A.	Steelworks at Ozimek, producing crude steel and cast steel	
	Huta "Zabrze" S.A.	Steelworks at Zabrze, producing crude steel, cast iron, and cast steel	
	Huta "Zygmunt" S.A.	Steelworks at Bytom, producing crude steel, cast iron, and crude steel	
Semimanufactures only	Huta Cedler S.A.	Steelworks in Sosnowiec, producing hot-rolled products, cold-rolled strip, and cast iron	
	P.P. Huta "Kosciuszko"	Steelworks at Chorzow, producing hot-rolled products	
	Huta "Pokoj" S.A.	Steelworks at Ruda Slaska, producing hot-rolled products	
	Huta "Andrzej" S.A.	Steelworks at Zawadskie, producing pipes	
	Huta "Ferrum" S.A.	Steelworks in Katowice, producing pipes	
	P.P. Huta "Bobrek"	Steelworks in Bytom, producing pig iron, hot-rolled products, and cast iron	
	Huta "Buczek" S.A.	Steelworks in Sosnowiec, producing pipes and cast iron	
	P.P. Huta "1 Maja"	Steelworks in Gliwice, producing hot-rolled products	
	Zaklad Wielkopiecowy "Szczecin" Sp. z o.o.	Steelworks at Szczecin, producing pig iron	

See footnotes at end of table.

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TABLE 6—Continued
POLAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1]

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity
Sulfur	Includes:	Of which:	5,700.[3]
	P.P.Kopalne i Zaklady Przetworcze Siarki "Siarkopol"	Operations at Tarnobrzeg, mining the Jeziorko-Grebow-Wydza deposit	
	P.P. Kopalnie i Zaklady Chemiczne Siarki "Siarkopol"	Operations at Grzybow, mining the Osiek and Grzybow-Gacki deposits	

[1]The data presented in this table were compiled, in large measure, from information provided in the Minerals Yeabook of Poland (Bilans Gospodarki Surowcami Mineralnymi w Polsce Na Tle Gospodarki Swiatowej 1995-2003) prepared and published by the Department of Mineral and Energy Policy, Mineral and Energy Economy Research Centre of the Academy of Science of Poland, The Ministry of Environmental Protection, Natural Resources, and Forestry. Additionally, very valuable information and criticism was provided by Mr. Krystof Galos and other members of his academic department.
[2]The production of barite at the "Boguszow" Barite Mine was stopped in 1997 because of large-scale area flooding and its future status is uncertain.
[3]Annual capacity listed is total for all deposits, mines, or companies that produce the commodity.
[4]In order of size.

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TABLE 7
POLAND: RESOURCES OF MAJOR MINERALS IN 2005

(Million metric tons of ore unless otherwise specified)

Commodity		Number of deposits		Geologically documented resources		
		Total	Exploited	Total	Exploited	Annual percentage change of total
METALS						
Copper		14	6	1,985	1,603	-2.3
Lead and zinc		21	3	171	32	-1.7
INDUSTRIAL MINERALS						
Raw materials for chemicals:						
Sulfur, native		18	5	525	38	12
Rock salt		19	5	80,165	11,178	--
Barite		5	--	6	--	--
Potassium-magnesium salts		5	1	669	72	--
Raw materials for construction:						
Chalk		196	55	198	20	--
Clay:						
Argillaceous material for construction ceramics		1,209	311	3,987	524	--
Bentonite		8	1	2.7	0.5	--
Ceramic		29	6	145	11	2.8
Refractory		17	3	57	5	-1.8
Kaolin		14	2	215	82.2	--
Dolomite		11	4	353	164	1.7
Feldspar ore		8	2	94	11.2	-1
Gypsum and anhydrite		15	4	261	115	-1
Magnesite		6	1	13.3	3	--
Sand and gravel:						
Filling sand		32	10	4,600	1,173	--
Moulding sand		78	12	350	116	-1
Quartz sand for brick and concrete		159	46	719	134	-1
Gravel aggregates		5,118	1,893	14,637	3,302	1.0
Silica:						
Glass sand		30	8	599	218	--
Quartz, veined		7	3	7	5	--
Quartzite, refractory		19	1	14	7	-3.4
Stone:						
Stone for construction and road use		567	236	8,230	3,927	--
Limestone and marl for lime and cement use		178	38	18,110	6,063	--
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Bituminous		132	46	43,321	15,291	1.8
Lignite		76	10	13,724	1,878	1.0
Gas:						
Natural	billion cubic meters	260	180	151	121	-2
Coal methane	do.	48	20	86	22	1.2
Petroleum	do.	86	67	22	19	10

-- Zero.

Sources: Central Statistical Office of Poland, 2005, Statistical Yearbook of Industry; Polish Academy of Sciences, 2004, Minerals Yearbook of Poland; Concise Statistical Yearbook of Poland.

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TABLE 8
POLAND: IMPORTS OF SELECTED MINERAL COMMODITIES

(Thousand metric tons unless otherwise specified)

Commodity		2001	2002	2003	2004	2005
METALS						
Aluminum and articles thereof		310	374	354	520	551
Chromite		26	9	11	13 r	9 r
Cobalt, matte, oxide, and scrap	metric tons	86	71	88	70 r	159 r
Iron ore and concentrate		7,709	6,957	8,950	10,932	6,789
Lead:						
Concentrates, Pb content		4	5	2	--	--
Refined		12	33	32	33	34
Manganese, ore and concentrate		44	15	10	205 r	40 r
Steel:						
Flat-rolled, nonalloy semimanufactures		2,535	2,357	NA	2,862	3,602
Stainless and articles thereof		84	91	NA	144	163
Pipes and hollow profiles		289	344	NA	415	442
Zinc, metal refined		NA	8	12	17	13
INDUSTRIAL MINERALS						
Alumina		135	123	146	151 r	145 r
Barite		7	6	8	6 r	6 r
Bauxite		38	50	69	82 r	62 r
Bentonite		65	68	94	NA	NA
Cement:						
Clinker		251	67	70	NA	NA
Cement		347	654	719	NA	NA
Feldspar		144	168	155	NA	NA
Flourspar		5	6	5	NA	NA
Glass		466	549	534	707	759
Graphite, natural and synthetic		55	61	63	NA	NA
Gypsum and ahydrite		23	46	104	NA	NA
Kaolin, washed		61	70	72	NA	NA
Mineral fertilizers		1,426	1,609	1,875	1,999	1,648
MINERAL FUELS AND RELATED MATERIALS						
Coal, including briquets		1,903	2,768	2,560	2,335	3,372
Natural gas	million cubic meters	8,325	7,775	8,721	NA	NA
Petroleum:						
Crude		17,513	17,872	17,448	17,309	17,641
Refined		2,318	2,501	2,039	3,155	3,599

rRevised. NA Not available. -- Zero.

Sources: Central Statistical Office of Poland, Yearbook of Foreign Trade, 2003 and 2005; Polish Academy of Sciences, Minerals Yearbook of Poland, 1999-2003.

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TABLE 9
POLAND: EXPORTS OF SELECTED MINERAL COMMODITIES

(Thousand metric tons unless otherwise specified)

Commodity		2001	2002	2003	2004	2005
METALS						
Aluminum and articles thereof		230	264	319	332	385
Cadmium	metric tons	198	49	428	NA	NA
Cobalt, matte, oxide, and scrap	do.	14	1	--	NA	NA
Copper:						
Refined copper and copper alloys		233	288	277	282	291 r
Copper manufactures		143	123	121	177	163
Lead:						
Concentrates, Pb content		56	58	52	54	NA
Metal, refined		10	21	32	27	28
Silver and articles thereof	metric tons	1,094	1,135	1,254	683	319
Steel:						
Pig iron		41	3	16	NA	NA
Steel, crude		2	3	3	NA	NA
Flat-rolled, nonalloy semimanufactures		2,219	2,151	NA	2,694	2,148
Pipes and hollow profiles		202	35	NA	184	188
Zinc:						
Concentrate, Zn content		16	34	35	27 r	39 r
Metal and articles thereof		92	89	80	82	82
INDUSTRIAL MINERALS						
Cement		897	478	264	769	602
Glass		682	662	697	803	872
Salt		376	343	423	NA	NA
Sulfur		774	600	534	NA	NA
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Anthracite and bituminous		23,032	22,626	20,128	19,700	19,371
Lignite		15	42	37	NA	NA
Coke and semicoke	thousand metric tons	3,924	4,226	5,267	5,258	4,524
Petroleum, refined		2,523	2,446	1,389	NA	NA

rRevised. NA Not available. -- Zero.

Sources: Central Statistical Office of Poland, Yearbook of Foreign Trade, 2003 and 2005; Polish Academy of Sciences, Minerals Yearbook of Poland, 1999-2003.

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TABLE 10
SLOVAKIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2002	2003	2004	2005	2006
METALS						
Aluminum:						
Alumina		111,618	132,089	156,893	162,483	160,507
Aluminum ingot, primary		146,958	165,290	175,000 e	158,400	179,512
Copper:e						
Mine output, concentrate, Cu content		2 [3]	2	2	2	2
Metal:						
Smelter, primary and secondary	thousand metric tons	5	6	13	16	22 [3]
Refined, primary and secondary		8,100	5,800 [3]	--	--	--
Gallium, metale	kilograms	500	500	500	500	500
Gold, metal	do.	53	50	50 e	109 r	100
Iron and steel:						
Iron ore:						
Gross weight	thousand metric tons	-- r	-- r	-- r	-- r	--
Metal content	do.	-- r	-- r	-- r	-- r	--
Concentrate, gross weight	do.	326	302 r	290 r	259 r	250
Metal:						
Pig iron	do.	3,533	3,892	3,800	3,681	4,145
Ferroalloys, total electric furnacee, [4]	do.	95	95	95	95	95
Ferrochromium		5,695	1,924	2,000	867	900
Ferrosilicone		50,000	50,000	50,000	50,000	50,000
Steel, crude	thousand metric tons	4,275	4,709	4,564	4,242	5,094
Semimanufactures	do.	3,500 e	4,115 r	3,995 r	4,000 e	4,000 e
INDUSTRIAL MINERALS						
Barite, concentrate		25,820	12,000	27,060	26,000 r	25,000
Cement, hydraulic	thousand metric tons	3,141	3,147	3,158	3,499	3,593
Clays:						
Bentonite		66,128	74,938	69,252	75,752	93,373
Kaolin		33,000	31,000 r	89,420	85,000	30,000
Refractory		3,000 e	-- r	-- r	--	--
Ceramic		55,000	66,000 r	50,000 e	50,000 e	40,000 e
Dolomite	thousand metric tons	1,357	1,250	1,117	1,021	990
Gypsum and anhydrite, crude		121,700	93,800	127,100 r	107,000 r	110,000
Lime, hydrated and quicklime	thousand metric tons	911	847	961	946	1,104
Magnesite, concentrate		930,000	397,259	404,776	447,700	555,710
Nitrogen, N content of ammonia		410,000	288,000	275,223	295,286	300,000
Perlite		18,630	15,000	23,840	20,000	20,000
Salt		97,400	133,100	121,600	120,000	100,000
Sand and gravel	thousand cubic meters	1,399	1,300	1,300 e	1,800	1,800
Stone:						
Limestone and other calcareous stones for cement	thousand metric tons	3,694	3,453	4,501	6,034	6,611
Crushed stone	thousand cubic meters	4,715	5,075	4,472	6,541	8,727
Talc		2,290	4,200	7,100	7,000	7,000 e
Zeolites		28,000	28,000 r	37,000 r	42,000 r	40,000
MINERAL FUELS AND RELATED MATERIALS						
Coal, brown and lignite	thousand metric tons	3,401	3,077	2,952	2,511	2,500 e
Coke:e						
Metallurgical	do.	1,500	1,500	1,500	1,500	1,500
Unspecified	do.	200	200	200	200	200
Gas, manufactured, coke oven	million cubic meters	206	210	200	200	200
Petroleum:						
Crude:						
As reported	thousand metric tons	53	48	50	50	50
Convertede	thousand 42-gallon barrels	400	350	350	350	350
Refinery productse	do.	40,000	40,000	44,500	44,500	44,500

eEstimated; estimated data are rounded to no more than three significant digits. rRevised. -- Zero.

[1]Table includes data available through November 2007.

[2]In addition to the commodities listed, arsenic, diatomite, feldspar, illite, sodium compounds, sulfur, and sulfuric acid are produced, but available information is inadequate to make reliable estimates of output.

[3]Reported figure.

[4]May include some FeCrSi and FeNi, if any was produced.

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TABLE 11
SLOVAKIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies[1]	Location of main facilities[2]	Annual capacity
Aluminum	ZSNP Aluminum Works (Slovalco A.S.)	Ziar and Hronom, central Slovakia	108
Antimony:			
Ore	Liptovska Dubrava	Central Slovakia	50
Do.	Pezinok	Western Slovakia	50
Smelter	Vajskova	Central Slovakia	2
Cement	Lietavska Lucka, Stupava, and Turna	Slovakia	5,400
Coal:			
Brown	Hornonitranske Bane, a.s.	Prievidza, central Slovakia	3,500
Do.	Bana Dolina, a.s.	V'lky Krtis, southern Slovakia	500
Lignite	Bana Zhorie, a.s.	Holic, western Slovakia	400
Copper:			
Ore	Slovinky, Hodrusa-Hamre, and Rudnany	Central Slovakia	500
Refinery	Krompachy	do.	27
Gallium kilograms	ZSNP Aluminum Works (Slovalco A.S.)	Ziar and Hronom, central Slovakia	4,000
Iron:			
Ore	Nizna Slana and Rudnany	Central Slovakia	1,600
Concentrate	do.	do.	1,300
Lead-zinc, ore	Banska Stiavnica	do.	200
Magnesite	SMZ a.s., Jelsava	Eastern Slovakia	350
Do.	Slovmag a.s., Lubenik	Central Slovakia	150
Petroleum, refinery	Bratislava, Dubova	Slovakia	NA
Salt	Solivary a.s., Presov	Eastern Slovakia	150
Steel, crude	U.S. Steel Kosice	Eastern Slovakia, Kosice	4,000
Do.	Zeleziarne Podbrezova a.s.	Slovakia, Podbrezova	600

NA Not available.
[1]All mining companies are Government owned.
[2]Names and locations of mines and crude oil refineries are identical.

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The Mineral Industries of the Commonwealth of Independent States

Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan

By Richard M. Levine and Glenn J. Wallace

The Commonwealth of Independent States (CIS) was created in December 1991 by Republics of the former Soviet Union (FSU) and then extended to all the former Soviet Republics except the Baltic states of Estonia, Latvia, and Lithuania. In the adopted Declaration, the participants of the Commonwealth declared their interaction to be based on the principle of the sovereign equality of all members and that the member states were independent and equal subjects of international law. The CIS was not a state and it did not have supranational powers. In 2006, the members of the CIS were Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan. Turkmenistan discontinued permanent membership as of August 26, 2005, and became an associate member. Turkmenistan, however, was establishing closer cooperation with the CIS following the death of its President in December 2006 and the installation of a new President (Durdiyeva, 2007).

In September 1993, the Governments of the CIS states signed an agreement on the creation of an economic union that would form a common economic space based on the free movement of goods, services, labor, and capital; the union would work to coordinate monetary, tax, price, customs, and external economic policy; develop methods of regulating economic activity; and create favorable conditions for the development of direct production relations. To facilitate further integration, an agreement on deepening integration in the economic and social spheres was entered into by four countries (Belarus, Kazakhstan, Kyrgyzstan, and Russia) and Belarus and Russia signed an agreement in 1995 on the creation of a Commonwealth of Sovereign Republics for Belarus and Russia that would establish coordinating bodies. In February 1999, Tajikistan was recognized as a participant of the customs union, and by the decision of the Interstate Council of Belarus, Kazakhstan, Kyrgyzstan, and Russia, would have full rights in the union. In October 2000, the Governments of five countries (Belarus, Kazakhstan, Kyrgyzstan, Russia, and Tajikistan) signed an agreement to create a Eurasian Economic Community (EAEC). Armenia, Moldova, and Ukraine have observer status under the EAEC. In October 2005, Uzbekistan joined the EAEC. In September 2003, four countries (Belarus, Kazakhstan, Russia, and Ukraine) signed an agreement on the formation of a Common Economic Space (CES) (Interstate Statistical Committee of the Commonwealth of Independent States, undated).

Integration of the countries of the CIS was executed through its coordinating institutions (charter bodies, executive bodies, and the bodies of branch cooperation of the CIS). To reestablish ties among the mineral industries of the CIS states that had been broken with the dissolution of the Soviet Union, the Executive Committee of the CIS, with the participation of leading scientists and specialists, prepared a Mining Charter and an Agreement on Cooperation in the study, exploration, and use of mineral resources of the CIS states. The agreement was signed on March 27, 1997, by Armenia, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, and Ukraine. On the basis of this agreement, an intergovernmental council was formed to fulfill the mission of the agreement. An important step taken by the intergovernmental council was an agreement signed in Minsk, Belarus, on May 30, 2001, to settle disputes regarding mineral development in border areas, to implement environmental measures to protect the population of the neighboring states when developing mineral resources, and to specify conditions for cooperation between neighboring CIS states in mineral development. One of the basic documents regulating these matters was a Model Law Code regarding Earth's resources and their use signed by an interparliamentary assembly of the CIS countries in 2002; the Model Law Code deals with a wide range of issues regarding minerals and mineral development. By 2006, the intergovernmental council was coordinating more than 10 joint programs and projects relating to scientific and technical cooperation, harmonizing laws about the use of resources, and engaging in information exchanges (Glimadov, 2007).

The countries of the CIS, which were formerly part of the Soviet Union, inherited the Soviet reserve classification system, which was based on a system that was not comparable to that used in market economy countries. The Soviet system did not determine reserves based on the part of the reserve base that could be economically extracted or produced at the time of determination in a market economy system. Rather, the Soviet system was a cross-imposed system, which related, on the one hand, to the reliability of information on the quantity of material in place based on data obtained from an exploration grid and other testing and, on the other hand, on the economic viability of the material in place based on the goals of the central planning system. The term "reserve" when used in this report refers in most cases to reserves that were calculated according to the Soviet system. Countries of the CIS have been engaged in efforts to reevaluate their reserves according to market

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economy criteria, and if it is known that such a reevaluation has been made, it is noted in the text of this report. [A more detailed description of the Soviet reserve classification system is available in the U.S. Bureau of Mines Minerals Yearbook 1989, v. 3, Europe and the USSR.]

References Cited

Durdiyeva, Chemen, 2007, Ashgabat hosts summit of CIS prime ministers: Cental Asia-Caucasus Institute, November 28. (Accessed February 25, 2008, at http://www.cacianalyst.org/?q=node/4750.)

Glimadov, I.L. 2007, Mezhpraviltel'stenniy sovet po raxvedke, ispol'zovaniyu I okhrane nedr-effektivnaya forma sotrudnichestva starn SNG v sfere nedropol;zovaniya [The inter-governmental council on exploration, use, and environmental issues regarding the use of the earth's mineral resources—An effective form of cooperation between the countries of the CIS in the sphere of the use of the earth's resources]: Gornyy Zhurnal [Mining Journal], no. 10, p. 4-7.)

Interstate Statistical Committee of the Commonwealth of Independent States, [undated], About Commonwealth of Independent States: Interstate Statistical Committee of the Commonwealth of Independent States. (Accessed March 6, 2008, at http://www.cisstat.com/eng/cis.htm.)

ARMENIA

Armenia was a major producer of molybdenum, ranking seventh in the world in mine output in 2006 (Magyar, 2008). Besides molybdenum, Armenia produced other metals, including copper, gold, lead, silver, and zinc; and industrial minerals, including basalt, diatomite, granite, gypsum, limestone, and perlite. The country also produced aluminum foil using raw materials imported from Russia and had developed a diamond cutting industry based on imported rough diamond. A major part of the country's mine production was exported. Armenia had almost no domestic fuel production and relied for electric power on a domestic nuclear powerplant and hydroelectric plants. It imported fuel for its nuclear powerplant and natural gas from Russia.

Armenia possesses significant resources of copper, gold, iron, lead, molybdenum, and zinc. It also has resources of construction material, such as basalt, granite, limestone, marble, tuff, and so forth; semiprecious stones, such as agate, jasper, obsidian, and so forth; and other nonmetallic minerals, such as bentonite, diatomite, perlite, and zeolite. The copper, copper-molybdenum, and copper-polymetallic deposits that occur in the north of Armenia contain about 475 million metric tons (Mt) of ore. The Zangezur copper-molybdenum complex possesses large molybdenum reserves, which are concentrated in the Kadzharan porphyry deposit. Gold reserves at the Zod deposit, which was being mined by the Ararat Gold Recovery Co. (ARGC), were reportedly 80 metric tons (t) (Interfax Russia & CIS Metals & Mining Weekly, 2007a).

Production

Data on mineral production are in table 1.

Structure of the Mineral Industry

Table 2 is a list of major mineral industry facilities in Armenia.

Commodity Review

Metals

Aluminum.—The Kanaker aluminum foil rolling mill was founded in May 2000. It was one of the leading production facilities in Armenia and was the only producer of aluminum foil in the Caucasus and Central Asia regions. On May 18, 2000, the mill was integrated into the Russian aluminum company RUSAL and renamed ARMENAL and, in January 2003, the Armenian Government and RUSAL signed an investment cooperation agreement under which RUSAL acquired a 26% share and undertook modernization of the plant. Together with two other Russian foil mills (Sayanal in the Republic of Khakasia and Urals Foil), ARMENAL formed RUSAL's packaging division. The mill employed more than 600 people (RUSAL, 2007).

In 2006, ARMENAL produced 949.7 t of foil, including 945.5 t of plain foil and 4.2 t of aluminum tape. The mill was on track to operate at capacity by mid-2007. ARMENAL had a portfolio of orders from various foil consumers in Europe, the Middle East, the United States, and other regions. ARMENAL was scheduled to begin operating at full capacity in 2007, when it was expected to become one of the leading aluminum foil producers in the CIS; its sales would likely be targeted at the European and U.S. markets (RUSAL, 2007).

On October 26, RUSAL announced the reopening of ARMENAL after the completion of the modernization program. The renewed mill had super casters for continuous casting and a modernized billet mill (Quarto 180). Rolling equipment was equipped with automatic process control systems. Overall investment in the project exceeded $70 million. After modernization, ARMENAL was able to turn out products that met world standards, including foil that was less than 9μm-thick, which was in the highest demand on the international market. Implementation of the modernization project would allow for increasing foil output to 25,000 metric tons per year (t/yr), including 18,000 t/yr of thin foil (6-9μm) and 7,000 t/yr of household foil. Future plans included increasing output of plain foil up to 40,000 million metric tons per year (Mt/yr) (RUSAL, 2007).

Copper and Molybdenum.—The leading producer of copper and molybdenum concentrates in Armenia was the Zangezur copper-molybdenum complex followed by the Agarak copper-molybdenum complex. Copper was also mined at the Akhtala and the Kapan copper complexes. The country's copper smelter at Alavderdi was owned by the CJSC Armenian Copper Programme (ACP), which was a Liechtenstein-registered firm. Valex F.M. Establishment owned 81% of ACP; a Russian businessman owned the remaining 19% (Interfax Russia & CIS Metals & Mining Weekly, 2007b).

In 2006, ACP reduced blister copper production by about 11% to 8,791 t. The decrease in production was attributed to worn out equipment at ACP's roasting furnace. ACP planned to buy a new furnace with a capacity of 140 metric tons per day (t/d). In 2006, ACP processed 48,224 t of concentrate compared with 52,505 t in 2005. ACP purchased concentrate from the Zangezur copper-molybdenum enterprise and LLC Base Metals,

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which mined the Drmbon copper-gold field in Nagorno-Karabakh, which is a predominately ethnic Armenian enclave in Azerbaijan that has been the subject of warfare and dispute between Armenia and Azerbaijan concerning its status (Interfax Russia & CIS Metals & Mining Weekly, 2007b).

Plans called for the ACP to develop the Tekhut copper-molybdenum deposit, which was the second ranked copper-molybdenum deposit after the Kadzharan deposit; preliminary estimates of the ore reserves at the Tekhut deposit were 450 Mt at a grade of 1.6 Mt copper and 800,000 t molybdenum. ACP planned to mine between 25,000 and 30,000 t/yr of copper and 800 t/yr of molybdenum from this deposit (Interfax Russia & CIS Metals & Mining Report, 2007a).

The largest producer of copper and molybdenum concentrates, the Zangezur copper-molybdenum complex, processed 10.4 Mt of ore in 2006 and planned to process the same amount in 2007. The introduction of new capacity would result in Zangezur being able to increase ore processing in 2008 to 15 Mt/yr. Projections called for ore processing at Zangezur to increase eventually to between 17 and 18 Mt/yr (Interfax Russia & CIS Metals & Mining Weekly, 2007d). Zangezur, which was privatized at the end of 2004, was owned jointly by Cronimet Mining of Germany (60%), Yerevan Pure Iron Works (15%), Armenian Molybdenum Production, (12.5%), and LLC Zangezur Mining, which represented the enterprise's former management (12.5%) (Interfax Russia & CIS Metals & Mining Weekly, 2007d). In 2003, the Agarak copper-molybdenum complex was purchased by Comsup Commodities, Inc. of the United States. The Kapan ore beneficiation plant, which processed ore from the Kapan Mine, was purchased by the Deno Company of Switzerland in 2002 (MBendi, 2008).

Armenia also engaged in ferromolybdenum production at the Armenian Molybdenum Production (AMP) enterprise. AMP was established in 2003 and began steady operation in 2004. It had the capacity to produce 4,000 t/yr of ferromolybdenum. In 2006, AMP produced 2,581 t of ferromolybdenum, which was a 14% increase compared with production in 2005. AMP purchased all its molybdenum concentrate from Armenian producers and processed about 3,000 t of molybdenum concentrate in 2006. Its main supplier was the Zangezur copper-molybdenum complex (Interfax Russia & CIS Metals & Mining Report, 2007b).

Industrial Minerals

Diamond.—In 2006, Armenia reduced the value of cut diamond production by 22% to $240.5 million. Cut diamond sales fell by 20% to $243 million, and exports fell by 20.6% to $237.8 million. The decreases in output and sales were owing in part to a decrease in world prices for cut and polished diamond, as well as weaker dollar prices in Armenia (Interfax Russia & CIS Metals & Mining Weekly, 2007c).

Outlook

The Government plans to implement a program for reviving and developing the mining industry, with the objective of increasing the extraction of copper and molybdenum and of increasing the processing and export of semifinished metal products instead of raw materials. Armenia is expected to increase its energy supply as it is scheduled to receive natural gas from Iran from a pipeline that is under construction. The pipeline is being built in two stages; the first stage was scheduled for completion in 2007. The first stage would supply Armenia with 450 million cubic meters per year of gas. Once the pipeline is expanded to its full capacity, it was to supply Armenia with 2.8 billion cubic meters per year of gas (Interfax Russia & CIS Oil & Gas Weekly, 2007).

References Cited

Interfax Russia & CIS Metals & Mining Report, 2007a, Armenian copper to invest up to $250 mln in copper-molybdenum deposit: Interfax Russia & CIS Metals & Mining Report, issue 45, November 2-8, p. 18.

Interfax Russia & CIS Metals & Mining Report, 2007b, Armenia's AMP boost ferromolybdenum output 35% in 2006: Interfax Russia & CIS Metals & Mining Report, issue 4, January 19-25, p. 23.

Interfax Russia & CIS Metals & Mining Weekly, 2007a, Ararat gold in talks to sell assets in Armenia: Interfax Russia & CIS Metals & Mining Weekly, issue 27, June 29-July 5, p. 14.

Interfax Russia & CIS Metals & Mining Weekly, 2007b, Armenian copper program reduces blister output 22% in 2006: Interfax Russia & CIS Metals & Mining Weekly, issue 3, January 12-18, p 18.

Interfax Russia & CIS Metals & Mining Weekly, 2007c, Armenia's cut diamond output plummets 22% in 2006: Interfax Russia & CIS Metals & Mining Weekly, issue 3, January 12-18, p. 34.

Interfax Russia & CIS Metals & Mining Weekly, 2007d, Armenia's Zangezur aims to process 50% more ore in 2008: Interfax Russia & CIS Metals & Mining Weekly, issue 42, November 12-18, p. 16.

Interfax Russia & CIS Oil & Gas Weekly, 2007, Armenia could get 2.8 bcm of gas per year from Iran starting in 2008: Interfax Russia & CIS Oil & Gas Weekly, issue 5, February 1-7, p. 21.

Magyar, M.J., 2008, Molybdenum: U.S. Geological Survey Mineral Commodity Summaries 2008, p. 112-113.

MBendi, 2008, Armenia—Mining: Copper Mining, February. (Accessed February 15, 2008, at http://www.mbendi.co.za/indy/ming/cppr/as/am/p0005.htm.)

RUSAL, 2007, Armenal: RUSAL. (Accessed November 9, 2007, at http://www.rusal.com/index.php?lang=eng&subtopic=57&subtopic2=72&subtopic3=95&topic=3.)

AZERBAIJAN

Azerbaijan produced a range of metals and industrial minerals, including such metals as alumina, aluminum, lead, steel, and zinc. Its major importance as a world mineral producer, however, was based on its oil extracting industry. The country had been a significant oil producer for more than a century, but the recent focus was on developing offshore resources in the Caspian Sea.

In 2006, the value of the gross domestic product (GDP) in Azerbaijan increased by 34.5% compared with that of 2005, and the value of production in the extractive industries increased by 44.7%. The country's total foreign trade surplus tripled. Crude oil and oil products dominated exports. Exports also included ferrous and nonferrous metals (Interfax Russia & CIS Statistics Weekly, 2007). In 2006, the oil sector accounted for about 10% of the country's GDP. In the summer of 2006, the first flow of commercial oil was shipped through the Baku-T'bilisi-Ceyhan (BTC) pipeline (U.S. Energy Information Administration, 2007a).

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Production

Data on mineral production are in table 3.

Structure of the Mineral Industry

Table 4 is a list of major mineral industry facilities in Azerbaijan.

Commodity Review

Metals

Aluminum.—The Open Joint Stock Company (OJSC) Azerbaijan Aluminum concern, which comprised the Gyandzha alumina refinery, the Sumgait aluminum smelter, and the Zaglik alunite mine, planned to increase aluminum production to 60,000 t/yr by 2009. Output at the Sumgait smelter was to increase with the addition of two new potlines in 2007. In addition, a new smelter with a capacity of 100,000 t/yr was to be built in Ganca, which would raise the company's total capacity to 160,000 t/yr of aluminum. First output from the new smelter was projected for 2009 (Interfax Russia & CIS Metals & Mining Weekly, 2007b).

In 2006, Azerbaijan produced more than 363,000 t of alumina, which was approaching the peak amount of 400,000 t/yr produced in Soviet times. Alumina was sent to Sumgait for smelting, and the remainder was exported to Tajikistan. When the new Ganca smelter is operating, most of the alumina will likely be consumed domestically to produce aluminum (Interfax Russia & CIS Metals & Mining Weekly, 2007b).

Iron Ore.—On December 30, 2006, an agreement was signed between the Government of Azerbaijan and a number of foreign companies to explore and develop the Chovda, the Dagkeseme, the Geida, and the Karabakh iron ore deposits, the Kokhnemden field, and the Kurekchai Basin. Exploration was to be conducted within 48 months, although this period could be extended by an additional 16 months, if needed (Interfax Russia & CIS Metals & Mining Weekly, 2007a).

Industrial Minerals

Iodine and Bromine.—Azerbaijan was producing iodine and bromine from brines at the Baku and the Novoneftechala iodine and bromine plants, which were producing 440 t/yr and 800 t/yr of iodine, respectively, and 4,600 t/yr and 3,000 t/yr of bromine, respectively. These brines also contain commercial quantities of strontium that was not being extracted (Baba-Zade and others, 2007).

Mineral Fuels

Natural Gas.—In 2006, Azerbaijan produced almost 6.1 billion cubic meters of natural gas, which was a 6% increase compared with production in 2005. About 60% of natural gas production was produced by Azneft, which was subsidiary of State Oil Company of Azerbaijan (SOCAR). The remainder was produced by joint ventures, the leading one of which was Azerbaijan International Operating Company (AIOC). In 2008, increases in production from SOCAR and the Shah Deniz natural gas and condensate field could increase the country's production to more than 500 billion cubic feet (almost 14.2 billion cubic meters) per year. Government sources in Azerbaijan predicted that the country would produce as much as 1.1 trillion cubic feet (more than 31 billion cubic meters) per year by 2011. Almost all the natural gas that Azerbaijan produced came from offshore fields. The country's leading natural gas field was the Bakharly oilfield and gasfield, which is located off the southern tip of the Absheron Peninsula; this field accounted for almost one-half of the country's natural gas output (U.S. Energy Information Administration, 2007b).

Azerbaijan's major natural gas production increases were expected to come from the development of the Shah Deniz offshore natural gas and condensate field, which industry analysts estimated to be one of the world's leading natural gas field discoveries of the past 20 years. Shah Deniz, which is located offshore approximately 60 miles (96.6 km) southeast of Baku, is being developed by the Shah Deniz consortium (whose members are BP p.l.c., Statoil ASA of Norway, SOCAR, LukAgip [a joint venture of Lukoil Corp. (a Russian owned company) and Azienda Generale Italiana Petroli (Agip) (an Italian owned company)], National Iranian Oil company (NICO), TotalFinaElf S.A. of France, and Turkiye Petrolleri Anonim Ortaklig (TPAO) (U.S. Energy Information Administration, 2007b).

With the development of Shah Deniz, Azerbaijan could eventually become a net natural gas exporter, although Azerbaijan would remain a net importer during 2007. Gas purchases from Russia were officially suspended in early 2007 when Shah Deniz started producing. Azerbaijan's natural gas exports were likely to be transported mainly through the South Caucasus pipeline, which was also known as the Baku-T'bilisi-Erzurum pipeline. It was to run parallel to the BTC pipeline for most of its route before connecting to the Turkish gas pipeline network near the town of Horasan. The pipeline was expected to transport 233 billion cubic feet (about 6.6 billion cubic meters) per year initially, which could be increased eventually to 700 billion cubic feet (almost 20 billion cubic meters) per year (U.S. Energy Information Administration, 2007b).

Petroleum.—Azerbaijan was the leading contributor to the non-Organization of the Petroleum Exporting Countries (OPEC) growth in global oil supply during 2006. Growth in oil production had come almost exclusively from the Azeri-Chirag-Guneshli (ACG) group of fields. The ACG group of fields produced more than 65% of the country's oil, and this share was expected to increase. According to industry journals, estimates of Azerbaijan's proven crude oil reserves ranged between 7 and 13 billion barrels (Gbbl) [about 950 Mt to 1.77 billion metric tons (Gt)], but the estimate of SOCAR, which was based on the Soviet reserve classification system, set proven oil reserves at 17.5 Gbbl (almost 2.4 Gt). The Soviet reserve classification system is not based on market economy criteria. The country's largest hydrocarbon structures offshore in the Caspian Sea accounted for most of the country's current petroleum production (U.S. Energy Information Administration, 2007c).

Although SOCAR's fields that were developed in the Soviet era were in decline, since 1991, large-scale new projects and the

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revitalization of existing facilities have been financed through foreign direct investment and have revitalized the country's oil sector. Azerbaijan had signed more than 20 major agreements to develop oilfields with about 30 companies from 15 countries (U.S. Energy Information Administration, 2007c).

Azerbaijan exported almost all its oil through the newly built BTC pipeline, which bypasses Russia. Azerbaijan began filling the BTC pipeline in 2005. Small amounts of oil were exported by rail to the coast of Georgia and then by pipeline to Novorossiysk in Russia. In 2006, the AIOC, which is the consortium that was developing the AGC field, announced that it would supply only 60% of the oil for the pipeline, which opened the way for Kazakhstan to ship oil through the BTC (U.S. Energy Information Administration, 2007c).

Azerbaijan's other export routes included the Baku-Novorossiysk pipeline (northern route) by way of Russia to the Black Sea and the Baku-Supsa pipeline (the Western early oil route), which was used when the BTC was not available (U.S. Energy Information Administration, 2007c).

Crude oil was refined domestically at two refineries—the Azerneftyag refinery (formerly the Baku refinery), which had a capacity of 242,000 barrels per day (bbl/d); and the Heydar Aliev (formerly Azernefteyagandzhah) refinery, which had a capacity of 200,000 bbl/d. Refinery utilization rates were as low as 40%. Both refineries were in need of modernization and pollution control equipment (U.S. Energy Information Administration, 2007c). In 2006, the country produced about 7.796 Mt of oil products, which was an increase of 1.9% compared with production in 2005.

Azerbaijan also produced liquefied petroleum gas (LPG) at the Heydar Aliev refinery. In 2006, the refinery produced 1.5 million barrels (Mbbl), which was a decrease of 17% compared with production in 2005 (U.S. Energy Information Administration, 2007c).

Outlook

The achievement of capacity flow through the BTC pipeline is expected to enable oil production from the offshore ACG project to increase. Increasing oil production and the concomitant increased oil revenues are expected to contribute to a doubling of Azerbaijan's GDP by 2008 (U.S. Energy Information Administration, 2007a).

References Cited

Baba-Zade, V., Ramazanov, V., Mushaev, S., and Dzhafarli, M., 2007, Mineral'no-syr'yevye resursy Azerbbaydzhanai perspektivy ikh ispol'zovaniye [Mineral raw material resources of Azerbaijan and prospects for their use]: Gornyy Zhurnal [Mining Journal], no. 10, p. 14-19.

Interfax Russia & CIS Metals & Mining Weekly, 2007a, Azerbaijan's president approves iron ore mining contract: Interfax Russia & CIS Metals & Mining Weekly, issue 24, June 8-14, p. 17.

Interfax Russia & CIS Metals & Mining Weekly, 2007b, Azerbaijan to boost alumina output to 160,000 tpy by 2009: Interfax Russia & CIS Metals & Mining Weekly, issue 24, June 8-14, p. 13.

Interfax Russia & CIS Statistics Weekly, 2007, Azerbaijan's economy in 2006: Interfax Russia & CIS Statistics Weekly, issue 9, February 17-23, p. 3-5.

U.S. Energy Information Administration, 2007a Azerbaijan—Background: U.S. Energy Information Administration country analysis brief, December. (Accessed February 1, 2008, at http://www.eia.doe.gov/emeu/cabs/Azerbaijan/Background.html.)

U.S. Energy Information Administration, 2007b, Azerbaijan—Natural gas: U.S. Energy Information Administration country analysis brief, December. (Accessed February 2, 2008, at http://www.eia.doe.gov/cabs/Azerbaijan/NaturalGas.html.)

U.S. Energy Information Administration, 2007c, Azerbaijan—Oil: U.S. Energy Information Administration country analysis brief, December. (Accessed February 2, 2008, at http://www.eia.doe.gov/cabs/Azerbaijan/Oil.html.)

BELARUS

Belarus has a number of mineral production enterprises, including a steel minimill, a nitrogen production enterprise, two oil refineries, and a potash mining enterprise. An oil pipeline that passes through Belarus transports about 70 Mt/yr of Russian oil to Europe, and a gas pipeline that passes through Belarus, transports about 20% of Russia's gas exports to Europe.

Minerals in the National Economy

In 2006, the fuel sector accounted for 21.8% of the value of the country's industrial production; the chemical and petrochemical sector, 11.2%; the construction materials sector, 4.4%; the ferrous metallurgical sector, 3.6%; and the nonferrous metallurgical sector, 0.2% (Belarus i Rossiya, 2007). Belarus profited from the increase in energy prices by importing oil from Russia at preferential prices and then processing it and exporting the refinery products at international market prices. Also, the country benefited from high prices for fertilizers and steel, which were its major exports. Belarus had one of the world's most energy-intensive economies and was highly dependent on energy imports. Imported natural gas met 60% of the country's energy requirements.

Production

In 2006, the value of industrial production in Belarus increased by 11.3% compared with that of 2005. The value of production increased by 23.1% in the fuel sector, by 14.7% in the construction materials sector, and by 11.2% in the ferrous metallurgy sector. Of the main mineral products produced in Belarus, the country increased production of rolled products and crude steel by 10.7% and 6%, respectively, compared with that of 2005, but production of potash decreased by 4.9% (table 5; Interfax Russia & CIS Statistics Weekly, 2007b).

Structure of the Mineral Industry

The Belneftekhim State Concern for Oil and Chemicals, which included among its many enterprises the country's oil production, refining, and transport facilities and potash production enterprise, was the leading mineral production concern in the country. It included 50 organizations, which included practically all enterprises that produced chemical products. The country's only mineral production enterprise that played a major role in world markets was its potash producer, Republican unitary enterprise (RUE) Production Amalgamation (PA) Belaruskali, which mined the Starobin deposit. Belaruskali was the world's third ranked potash producer in 2006 following Canada and Russia (Ober, 2008). Belaruskali comprised four mine and beneficiation complexes, auxiliary shops, and

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servicing units, which together employed about 20,000 persons. Belaruskali produced potash fertilizers in the form of fine, fine crystallized, and granulated concentrate of potassium chloride. Besides potash fertilizer, Belaruskali produced a variety of salts used for domestic, industrial, and agricultural purposes. The founders of the Belarus potash company were RUE PA Belaruskali and Russia's Open Joint Stock Company (OJSC) Uralkali (table 6; Republican unitary enterprise Production Amalgamation Belaruskali, 2007).

Mineral Trade

In 2006, the value of exports of mineral products increased compared with that of 2005. Exports of nitrogen fertilizers in the first eleven months of the year increased by 12% and those of oil products increased by 11.9% (Interfax Russia & CIS Statistics Weekly, 2007a). Belarus increased exports of iron and steel products by 24.1% to $91.85 million. Exports in tonnage rose by 11.9% to 1.826 Mt (Interfax Russia & CIS Metals & Mining Weekly, 2007b). Plans called for the Belarusian Steelworks to increase its quantity of steel exports by 20% in 2007 owing to the addition of new production capacity. Its export strategy would include consolidating its position in the Latin American market and acquiring a niche in the Chinese market (Interfax Russia & CIS Metals & Mining Weekly, 2007a).

Belarus held 34% of the global potash export market in 2006. About 80% of the country's potash production was exported. Exports of potash mineral fertilizers to world markets were conducted by way of the Closed JSC (Joint Stock Company) Belarus Potash Company, the founders of which on parity conditions were Open JSC Uralkali and RUE PA Belaruskali. Production from RUE PA Belaruskali was exported to more than 50 countries in Africa, East Asia, Europe, India, North America, and South America (Republican unitary enterprise Production Amalgamation Belaruskali, 2007).

Tensions arose between Belarus and Russia when Russia decided to charge Belarus the world market rate for gas it consumed rather than the lower rate it had been charging. In March, Russia's state gas monopoly, Gazprom, announced that in 2007, Belarus would be charged European rates for Russian gas, which would mean that Belarus would pay up to five times as much for gas imports. At yearend, Belarus and Gazprom signed a contract for gas deliveries just before a delivery deadline was set to expire. The deal more than doubled the price that Belarus would pay for Russian natural gas in 2007, and raised the price it would pay by 2011 to European levels. Before signing the agreement, Belarus had threatened to retaliate by interrupting Russian gas crossing the country on its way to Western Europe, which echoed a similar dispute with Ukraine.

Under the agreement, Gazprom would gain a 50% stake in Belarus's state-owned domestic gas-transport monopoly, Beltranshaz. Beltranshaz controlled Belarus's local gas transmission pipeline network. Gazprom already owned all Belarus's international transit pipelines through which it shipped about 20% of Russia's gas exports to Europe. The remaining 80% of Russia's gas exports was transported by pipeline across Ukraine (Kupchinsky, 2006; Radio Free Europe/Radio Liberty, 2007).

In the area of oil transport, the Russian company Transneft was proposing to construct an oil pipeline that would bypass Belarus and would be capable of transporting 50 Mt/yr of oil. The approximately 1,000-kilometer (km) Unecha-Velikiye Luki-Primorsk pipeline could be built in less than 18 months (Interfax Russia & CIS Oil & Gas Weekly, 2007).

Outlook

Belarus is expected to continue to be a major supplier of potash to world markets. A program for the development of RUE PA Belaruskali for the period 2006-12 addresses development of ore reserves and is based primarily on the construction of a new mine in the Krasnoslobodski area and on renovating out-of-date equipment. A main direction will be a steady increase in the quality and consumer properties of fertilizers to make them more competitive on the world market. Possessing a sufficient raw materials base with a high production potential and highly qualified personnel, Belaruskali has the potential to be a major world potash supplier for many decades (Republican unitary enterprise Production Amalgamation Belaruskali, 2007).

References Cited

Belarus i Rossiya [Belarus and Russia] 2007, Statisticheskiy Sbornik [Statistical compendium]: Moscow, Ministerstvo statistiki i analyza Respubliki Belarus and Federal'naya Sluzhba Gosudarsvennoy Statistiki [Ministry of Statistics and Analysis of the Republic of Belarus and the Federal State Statistics Service of Russia], 164 p.

Interfax Russia & CIS Metals & Mining Weekly, 2007a, Belarussian steel works to boost exports 20% annually: Interfax Russia & CIS Metals & Mining Weekly, issue 11, March 9-15, p. 24, 25.

Interfax Russia & CIS Metals & Mining Weekly, 2007b, Belarus boosts ferrous metal exports 24.1% in 2006: Interfax Russia & CIS Metals & Mining Weekly, issue 9, February 23-March 1, p. 40.

Interfax Russia & CIS Oil & Gas Weekly, 2007, Lithuania offers Belarus help with oil supplies: Interfax Russia & CIS Oil & Gas Weekly, no. 6, February 8-14, p. 12.

Interfax Russia & CIS Statistics Weekly, 2007a, Belarussian exports of staple commodities: Interfax Russia & CIS Statistics Weekly, issue 8, February 10-16, p. 8.

Interfax Russia & CIS Statistics Weekly, 2007b, Belarussian GDP grows 9.9%, industrial output up 11.3% in 2006: Interfax Russia & CIS Statistics Weekly, issue 7, February 3-9, p.

Kupchinsky, Roman, 2006, Russia/Belarus—Is a gas war brewing?: Radio Free Europe/Radio Liberty, April 3. (Accessed February 16, 2008, at http://www.rferl.org/featuresarticle/2006/04/04805ae4-dc2a-401c-83e2-d85524b4d90d.html.)

Ober, J.A., 2008, Potash: U.S. Geological Survey Mineral Commodity Summaries 2008, p. 128-129.

Radio Free Europe/Radio Liberty, 2007, Belarus, Russia sign last-minute gas deal: Radio Free Europe/Radio Liberty January 1. (Accessed February 16, 2008, at http://www.rferl.org/featuresarticle/2007/01/d64207bc-92e3-4a82-aecd-d3de240b7396.html.)

Republican unitary enterprise Production Amalgamation Belaruskali, 2007, Home page: Republican unitary enterprise Production Amalgamation Belaruskali. (Accessed December 10, 2007, at http://www.kali.by/english/bel_main.html.)

GEORGIA

During the Soviet period, a range of mineral commodities was mined in Georgia, which included arsenic, barite, bentonite, coal, copper, diatomite, lead, manganese, zeolite, and zinc, among others. The country had been a major producer of high-grade

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manganese ore for about a century, and ore reserves were significantly depleted. Part of the manganese was used within Georgia for ferroalloys production. Following the dissolution of the Soviet Union, mineral production declined sharply.

Georgia's main role in the world mineral supply was serving as a transport route for oil and gas shipments out of the Caspian regions to world markets. Three of the new large oil and gas export pipelines that had been or were being constructed in the Caspian region pass through Georgia. These included the Baku-T'bilisi-Ceyhan, the Baku-T'bilisi-Erzurum, and the Baku-Supsa (Western early oil route) pipelines. Plans called for Georgia to receive a larger amount of natural gas for shipment from Caspian Sea deposits in Azerbaijan beginning in 2007 (Interfax Russia & CIS Oil & Gas Weekly, 2007a, b).

Production

Data on mineral production are in table 7.

Structure of the Mineral Industry

Georgia's main nonferrous and precious metals mining enterprise was the Madneuli mining and beneficiation complex, which mined the large copper-polymetallic Madneuli deposit (table 8). This deposit reportedly contained 48 t of gold reserves. Madneuli had been mined by the Madneuli mining and beneficiation complex and a joint Georgian-Austrian enterprise, Quartzite Ltd., which operated a gold recovery mill. In 2005, Madneuli was privatized with a tender awarded to Stanton Equities Corp., which was a subsidiary of Russia's Industrial Investors Group, and which also acquired a stake in the Quartzite mill.

Stanton Equities also received a 50% stake in Trans-Georgian Resources, which held the license to the Sakdrisi copper-gold deposit. Stanton Equities was planning to construct a second copper concentrator in the village of Kazreti to process ore extracted from the Sakdrisi deposit. In addition, work was being conducted to construct a plant to process waste from the concentrator according to a contract signed with the country's Ministry of Environmental Protection and Natural Resources, which was within the framework of a memorandum on environmental protection that the company signed with the ministry (Interfax Russia & CIS Metals & Mining Weekly, 2007).

Georgia had mined manganese ore from the Chiatura deposit for more than a century. A portion of the ore was used to produce manganese ferroalloys at the Zestafoni ferroalloys plant. In February, Stemcor UK Ltd., which was based in the United Kingdom, bought a controlling stake in the Zestafoni ferroalloys plant. In November, at an auction organized by the Georgian Natural Resources and Environment Protection Ministry, Manganese Georgia (a subsidiary of Stemcor) bought Chiaturmarganets, which was the country's manganese mining and beneficiation complex, and acquired a 40-year license to mine manganese ore at the Chiatura deposit. According to the conditions of the tender, the company must produce at least 350,000 t of manganese concentrate within the first year of its operation and at least 400,000 t/yr in the following years. At least 200,000 t/yr of the concentrate produced must be processed in Georgia. Stemcor, by purchasing Chiatura—which was the main supplier of concentrate for the Zestafoni plant—established control over the entire production cycle. Also, Stemcor appeared able to secure the energy supply for its operations as the Georgian Government endorsed a draft Presidential Decree to sell the 100% Government stake in the Vartsikhe hydropower plant cascade to Manganese Georgia (Interfax Financial & Business Report, 2006).

Outlook

Production in the mineral industry is reviving in Georgia. As a result, the country could increase considerably its production of copper, gold, manganese concentrates and ferroalloys, and other mineral products.

References Cited

Interfax Financial & Business Report, 2006, British company to set up major metallurgy holding in Georgia: Russia & CIS Business and Financial Newswire, November. (Accessed February 26, 2008, at https://www.opensource.gov.)

Interfax Russia & CIS Metals & Mining Weekly, 2007, Industrial investors to set up copper concentrate plant in Georgia: Interfax Russia & CIS Metals & Mining Weekly, issue 6, February 9-15, p. 17.

Interfax Russia & CIS Oil & Gas Weekly, 2007a, Georgia holding off on gas price increase: Interfax Russia & CIS Oil & Gas Weekly, issue 3, January 18-24, p. 13.

Interfax Russia & CIS Oil & Gas Weekly, 2007b, Lithuania backs Georgia's policy of energy diversification: Interfax Russia & CIS Oil & Gas Weekly, issue 5, February 1-7, p. 20, 21.

KAZAKHSTAN

Kazakhstan ranked second only to Russia among the countries of the CIS in its quantity of mineral production. It is endowed with large resources of a wide range of metallic ores, industrial minerals, and mineral fuels, and its metallurgical sector is a major producer of a large number of metals from domestic and imported raw materials. Its mining sector produced bauxite, chromite, copper, gold, iron, lead, manganese, and zinc ores, and its metallurgical sector produced such metals as beryllium, bismuth, cadmium, copper, ferroalloys, lead, magnesium, rhenium, steel, tantalum, titanium, and zinc. The country produced other nonferrous and precious metals and industrial minerals as byproducts (or in smaller-scale operations), such as arsenic, barite, cadmium, molybdenum, phosphate rock, and silver. The country was a large producer of mineral fuels, including coal, natural gas, oil, and uranium.

Minerals in the National Economy

In 2006, industry and mining accounted for about 39.5% of Kazakhstan's GDP (Federation of International Trade Associations, The, 2008). The petroleum industry accounted for approximately 30% of the GDP (U.S. Energy Information Administration, 2008a). Mining accounted for 4% of the GDP and 19% of industrial production (United World, 2006). In 2006, the extractive industries accounted for about 58% of the value of industrial production (Agenstvo Respubliki Kazakhstan po Statistiki, 2007).

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Government Policies and Programs

According to the 2003 Land Code, only native born and naturalized citizens of Kazakhstan and Kazakhstan companies may own land, and certain categories of land are excluded from private ownership. Only state-owned entities may permanently use land according to this law. Land may be leased on a short-term or long-term basis, with short-term land leases lasting for up to 5 years and long-term leases lasting for a maximum of 49 years. Kazakhstan law specifies that no sectors of the economy are fully closed to foreign investors, but that there are some limitations on participation, depending on the sector. The 2005 Production Sharing Agreement (PSA) law mandated that, for offshore projects, the state oil company must have a minimum 50% ownership stake. In 2004, the Government amended the law regulating oil and gas exploration by assigning to the state the right of first refusal on the purchase of shares of PSAs in the extractive industries. The law, which applies to preexisting contracts as well as future contracts, is said by the Government to supersede any preemptive rights consortium partners might have negotiated in their original contracts.

Amendments passed to the Oil and Gas Law in 1999 require mining and oil companies to use local goods and services. Subsurface users must comply with local content regulations, which obligate them to purchase goods and services from Kazakhstan entities (provided that the local goods meet minimum project standards) and they must also give preference to the employment of local personnel. In their tenders, prospective subsurface users are required to specify the anticipated local content of their work, goods, and services. Amendments to the Law on Subsurface Use that were passed in 2004 also require that tender proposals specify the user's commitment to developing regional infrastructure and contributing to the provision of social services.

The Government of Kazakhstan has a major role in overseeing foreign investment. Government officials at the highest levels have screened major foreign investment proposals, such as the PSA for Kashagan (Kazakhstan's massive offshore Caspian Sea oilfield), and the PSA for the Karachaganak oilfield and gasfield, which appears to have had the President of Kazakhstan's personal imprimatur (U.S. Department of State, 2007).

Production

In 2006, increases in production were reported or estimated for almost all mineral commodities. Data on mineral production are in table 9.

Structure of the Mineral Industry

Eurasian Natural Resources Corp. (ENRC) was a mining and metals group that accounted for about 5% of Kazakhstan's GDP and had annual sales of more than $3 billion in 2006. The ENRC group controlled Aluminium of Kazakhstan, Kazchrom chromite mining and ferroalloys production enterprise, KazMarganets (formerly Zhairem) manganese mining and beneficiation complex, and the Sokolovsko-Sarbay Mining and Production Union (SSGPO), which was the main supplier of iron ore to Russia's Magnitogorsk Iron and Steel Works (table 10). The leading shareholders in ENRC were the Kazakhstan Government followed by the copper company Kazakhmys PLC (Reuters, 2007; Embassy of the Republic of Kazakhstan, 2008). Kazakhmys, which was the country's major copper producer, was a United Kingdom-registered copper mining company with its main assets located in Kazakhstan. Its headquarters were located in London and the headquarters of its main subsidiary, Kazakhmys Corp., were located in Dzhezkazgan, Kazakhstan. In October 2005, the company was listed on the London Stock Exchange with an opening market capitalization of £2.6 billion. Glencore International AG, which was headquartered in Switzerland, owned or controlled (by way of subsidiaries) 99% of the shares in Kazzinc JSC, which was the country's large integrated lead and zinc producer, and which also produced copper, gold, silver, and other byproduct metals (Interfax Russia & CIS Metals & Mining Weekly, 2007c).

All the country's major oilfield and gasfield developments since Kazakhstan achieved statehood in 1991 were by projects in which foreign companies and Kazakhstan state-owned firms had forms of joint ownership. The country's uranium industry was controlled by Kazatomprom, a holding company engaged in six main areas of activity—energy, geologic exploration, metallurgy, scientific support and staff training, social support, and uranium mining. Kazatomprom exercised control in part by holding stakes in a number of uranium industry enterprises in the country. Kazatomprom was 100% state owned and also was the main importer, exporter, and transporter of uranium and other products used in the nuclear power industry (Interfax Russia & CIS Metals & Mining Weekly, 2007g).

Mineral Trade

Hydrocarbons (65%) and ores and metals (14%) accounted for 79% of the value of the country's exports (Federation of International Trade Associations, The, 2008). Kazakhstan was sending 100% of its gas exports and 90% of its oil exports on routes through Russia. Discussions were underway concerning Kazakhstan diversifying its fuel export routes (Interfax Russia & CIS Oil & Gas Weekly, 2007). Metals were the second ranked export after crude oil (Embassy of Kazakhstan in the United Kingdom of Great Britain and Northern Ireland, 2008). The vast majority of Kazakhstan's metal output was exported. China was playing an increasing role as a recipient of Kazakhstan's metal exports. Kazakhmys exported 85% of its copper cathodes and rods to China (United World, 2006). Kazakhstan had concluded an agreement with China by which Kazakhstan's iron ore exports to China increased by 83% in 2006 compared with that of 2005 (Materials World, 2007).

Commodity Review

Metals

Aluminum.—Kazakhstan adopted a program to increase alumina output to reach between 1.6 and 1.8 Mt/yr in the 2007-10 period. High-quality bauxite reserves, which were estimated to be between 35 and 45 Mt, could be sufficient to

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maintain these production goals for only the next 6 to 10 years. Further development of alumina production would likely be based on reserves of lower quality bauxite and nonbauxite aluminum raw materials. In 2006, bauxite was the only aluminum raw material being mined in the country. In previous years, the country had mined nepheline syenite. Total bauxite reserves were reportedly 356.7 Mt in the C1 category, according to the reserves classification system used first in the Soviet Union and then in Kazakhstan, with another 82.3 Mt of C2 reserves and 13.3 Mt of subeconomic (zabalansovye) reserves (Kovzalenko, 2007). [A more detailed description of the Soviet reserve classification system is available in the U.S. Bureau of Mines Minerals Yearbook 1989, v. 3, Europe and the USSR.]

Bauxite reserves are concentrated in the north of the country. The Krasnooktyabrskoye bauxite mining directorate (KGBR) and the Torgayskiy bauxite mining directorate were the country's leading bauxite producers and the main suppliers of bauxite for the Pavlodar alumina plant. All bauxite mined in Kazakhstan was processed into alumina at the Pavlodar plant, which was one of the world's ten leading alumina plants in terms of output (Kovzalenko, 2007).

Beryllium and Tantalum.—Kazatomprom, which controlled the country's entire uranium industry, was engaged in full-cycle beryllium production that extended from ore processing to production of beryllium alloys at its Ulba Metallurgical Plant in Oskamen. Ulba was the only plant in the CIS with this production capability. Ulba was also the only enterprise in the CIS with the capability to process tantalum feedstock and produce finished products. Kazatomprom did not have its own tantalum resources and purchased tantalum concentrate (Interfax Russia & CIS Metals & Mining Weekly, 2007h).

Chromium.—Kazchrome was the world's single leading chromium ore mining enterprise, the world's third ranked ferrochrome producing enterprise, and the world's leading ferrochrome producer on the basis of chromium content. Kazchrome was one of the main assets of ENRC (Reuters, 2007; Embassy of the Republic of Kazakhstan, 2008). Kazchrome supplied high-quality ferroalloys to leading steelmakers worldwide, including countries in Central Asia, Southeast Asia, Europe, North America, and South America. Kazchrome had invested in new technology and plant facilities, which had increased its annual ferrochrome production to more than 1 Mt/yr, and it planned to increase production of calcined chrome ore pellets substantially by adopting new technology. Kazchrome consisted of the following four production units: the Aktobe and the Aksu ferroalloys plants, the Donskoy mining and beneficiation complex, and the KazMarganets manganese mining and beneficiation complex. It employed about 18,000 workers, reportedly had 169 Mt of high-grade chromium resources, and had 43 electric furnaces engaged in ferroalloy production. The company's Molodezhnaya Mine produced about 2 Mt/yr of chromite. The chromite mining division had three beneficiation plants with a combined capacity to process 5 Mt/yr of ore to produce 3.5 Mt/yr of concentrate. A newly constructed fired pellets plant that employed technology from the Finnish company Outokumpu Technology Oy was to have an annual capacity of 700,000 t (Eurasian Natural Resources Corp., 2008a).

Copper.—The country's major copper producer was Kazakymys PLC, which was engaged in mining, beneficiating, smelting, and refining copper products, including copper cathodes and rods. Kazakhmys operated 19 open pit and underground mines and 2 smelting and refining complexes. Kazakhmys also owned Mansfelder, Kupfer, & Messing GmbH (MKM), a copper products fabrication company located in Germany. In 2006, Kazakhmys increased production of copper cathode by more than 5% compared with that of 2005. Copper concentrate production increased by 9% compared with that of 2005. The increase in production resulted mainly from mining higher-grade copper ore as well as production from new mines, which included the Artemyevskoye, the Kosmurun, and the Zhomart Mines (Interfax Russia & CIS Metals & Mining Weekly, 2007a; Kazakhmys PLC, 2007).

Iron Ore.—In 2006, SSPGO produced a combined 16 Mt/yr of iron ore concentrate and fluxed pellets for domestic customers and foreign customers primarily in China and Russia. The iron content of its iron ore concentrate reached 66%, and the iron ore content of its fluxed pellets, about 61.5%. SSGPO was under the control of ENRC and its assets included the Kachar, the Kurzhunkul, the Sarbai, and the Sokolov iron ore open pits; the Sokolov underground mine; dolomite and limestone open pits; and concentrating, pelletizing, and stone-crushing facilities. Power for these operations was supplied by the Rudny heat and energy plant, which was purchased by SSGPO in 1998. SSPGO employed about 18,500 people. The company's investment program was directed at increasing production levels and efficiency through the installation of integrated computer systems. Through enhanced computer systems, capacity at the Sokolov open pit, for example, had risen substantially within the past 2 years. SSPGO reportedly had iron ore resources totaling 3.6 Gt, of which 1.5 Gt was reportedly proven and probable reserves capable of sustaining production for 40 years (Eurasian Natural Resources Corp., 2008b).

Lead and Zinc.—Kazzinc JSC was the country's leading producer of lead and zinc. In 2006, Kazzinc produced 289,095 t of zinc, which slightly exceeded its production target of 288,000 t. Sales revenues rose steeply to $1.758 billion from $792 million in 2005. Kazzinc planned to increase zinc production by 1.3% in 2007 compared with that of 2006. The company planned to invest $353 million in developing production in 2007 compared with the $193 million it invested in 2006. Plans called for spending $126 million of the planned investment on the New Metallurgy project, which included construction of a copper smelter and modernization of lead production facilities at the Ust-Kamenogorsk metallurgical plant (Interfax Russia & CIS Metals & Mining Weekly, 2007e).

ShalkiyaZinc N.V. was another zinc and lead mining company in Kazakhstan. The company's main operations were located in southern Kazakhstan and included the underground Shalkiya Mine in the Kyzylorda Region, a processing plant near the town of Kentau (which is located 165 km southeast of the Shalkiya Mine), and the Talap deposit, which is a greenfield deposit located 30 km southwest of the Shalkiya Mine. One of the company's major assets was the Shalkiya deposit, which reportedly was the largest known zinc deposit in Kazakhstan and accounted for approximately 30% of the country's total

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zinc reserves. The company sold zinc and lead concentrate to regional smelters and traders. ShalkiyaZinc was listed on the London Stock Exchange (London Stock Exchange plc, 2006; Reuters, 2006). Based on a new audit of its reserves, which was conducted by AMC Consultants of the United Kingdom according to the JORC system, ShalkiyaZinc planned to increase its lead-zinc ore extraction at the Shalkiya deposit to 4 Mt/yr from 3 Mt/yr by 2010. According to the latest audit, ShalkiyaZinc's probable metal reserves totaled 6.6 Mt of zinc and 1.7 Mt of lead. The new audit showed that the zinc content of ore that could be profitably mined was far lower than 3%, which was the previous assessment. ShalkiyaZinc had a contract with Outokumpu to construct a new ore processing plant at the deposit (Interfax Russia & CIS Metals & Mining Weekly, 2007f).

Manganese.—The KazMarganets manganese mining and processing enterprise was the country's main manganese producer and was under the control of Kazchrome, which was a part of ENRC. KazMarganets reportedly had measured and indicated resources totaling 47.7 Mt of manganese ore with proven and probable reserves totaling 24.5 Mt. KazMarganets was composed of the East Kamys and the Tur manganese ore deposits (Karaganda region), and the Zhezdy processing plant. It had the capacity to process more than 1 Mt/yr of ore to produce 330,000 t/yr of manganese concentrate. KazMarganets' investment program was directed towards the expansion of operating facilities and the discovery of new deposits in the Ulytau-Zhezdy area (Eurasian Natural Resources Corp., 2008a).

Titanium.—The Ust-Kamenogorsk titanium-magnesium complex (UKTMK) was producing at about 50% of its design capacity. It exported about 50% of the titanium sponge it produced to the United States. It had developed its own domestic resources of titanium raw material (which it had previously imported primarily from Ukraine) and had also commissioned facilities to produce titanium ingots and slabs. Ilmenite ore was mined at the Obukhovskoye, the Satpayevskoye, and the Shokashskoye deposits in Kazakhstan (Skorodumov and Nikitina, [2007]).

Mineral Fuels and Related Materials

Coal.—In 2006, Kazakhstan produced 96.3 Mt of coal, which was an 11.5% increase compared with production in 2005. Kazakhstan planned to increase coal production by less than 1% in 2007. Plans for 2007 also called for implementing development projects in the Ekibastuz subbituminous coal basin and closing unprofitable coal mines in the Karaganda basin (Interfax Russia & CIS Metals & Mining Weekly, 2007d). Long-range plans called for Kazakhstan to reduce coal consumption by 45% by 2024 as part of its program to achieve sustainable growth. At the same time, the use of renewable energy was targeted to increase from 0.2% in 2006 to 5% in 2024. Long-range plans also called for Kazakhstan to increase annual coal production to 145.6 Mt by 2020 according to the Coal Industry Department at the Energy and Mineral Resources Ministry. Production of metallurgical coal was projected to increase to 24.3 Mt in 2020 from 12.9 Mt in 2006, and production of steam coal, to 121.3 Mt from 83.4 Mt. Achieving the targeted level for 2020 would require an investment of $3.9 billion, of which $2.1 billion would be targeted for metallurgical coal development and $1.8 billion would be targeted for steam coal (Interfax Russia & CIS Metals & Mining Weekly, 2007b).

Coal mining in Kazakhstan was conducted by 33 companies, which included 5 foreign companies. Kazakhstan claimed to be among the world's 10 leading countries in coal reserves. The country has registered 49 deposits in its State reserve balance, which contains a total of 33.6 Gt and of which 21.5 Gt is hard coal and 12.1 Gt is brown coal. The reserves are located mainly in the Ekibastuz, the Karaganda, and the Shubarkol deposits and in the Turgai coal basin (Interfax Russia & CIS Metals & Mining Weekly, 2007b, c).

Natural Gas.—Although in 2006 Kazakhstan produced about as much natural gas as it consumed, the country was poised to become a net exporter in 2008 based on production at the Karachaganak and the Tengiz fields. More than 70% of the country's natural gas was produced by international consortia at the Karachaganak and the Tengiz fields. In 2007, the Oil and Gas Journal revised upwards its estimate of proven natural gas reserves in Kazakhstan to 100 trillion cubic feet (about 2.8 trillion cubic meters), which was roughly equal to Turkmenistan's natural gas reserves. Most of Kazakhstan's natural gas reserves are located in the west of the country, with about 25% of its proven reserves located in the Karachaganak field. This oil and gas condensate field reportedly has proven natural gas reserves of 48 trillion cubic feet (1.36 trillion cubic meters). The consortium developing Karachaganak expected to produce 900 billion cubic feet (about 25.5 billion cubic meters) by 2012. Natural gas production in Kazakhstan was almost entirely associated gas. The country had three gas processing plants (U.S. Energy Information Administration, 2008b).

Petroleum.—In 2006, Kazakhstan produced 64.9 Mt of oil and gas condensate, which was 5.5% more than in 2005, and exported 57.1 Mt (Interfax Russia & CIS Oil & Gas Weekly, 2007). Kazakhstan has most of the largest known oilfields in the Caspian Sea. The country's combined onshore and offshore proven hydrocarbon reserves have been estimated to be between 9 and 40 Gbbl (1.2 and 5.4 Gt), which is comparable to Algeria on the lower end and Libya on the higher end of the estimates. Major oil producing enterprises included CNPC-Aktobemunaigaz, Hurricane Kumkol Munai, Karachaganak Petroleum Operating BV, Mangistaumunaigaz, the Tengizchevroil joint venture, and Uzenmunaigaz, which accounted for about 70% of hydrocarbon production in the country. Other production was centered in smaller fields. Oil production growth was expected to increase in the next decade primarily from the Tengiz field, where production was expected to double, and from the Kashagan offshore field, which is located off the northern shore of the Caspian Sea near the city of Atyrau, and which could produce an additional 1 million barrels per day (Mbbl/d) after 2011. The Tengiz field, which had been developed since 1993 by the Tengizchevroil joint venture, was the country's leading oil producer; it had recoverable crude oil reserves estimated by Chevron Corp. to be between 6 Gbbl and 9 Gbbl (800 Mt and 1.2 Gt). According to Chevron, Tengiz could potentially produce 700,000 bbl/d by 2010 if its sour gas injection program were fully implemented (U.S. Energy Information Administration, 2008c).

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The Kashagan field is the largest oilfield outside the Middle East in terms of reserves and the fifth largest in the world. The field's recoverable reserves were estimated to be 13 Gbbl (1.77 Gt) of oil equivalent, with total reserves-in-place of about 38 Gbbl (5.2 Gt). The field could produce about 300,000 bbl/d by late 2011, and full-scale commercial production was expected to commence in 2013. Estimated peak production from Kashagan was estimated to be about 1.3 Mbbl/d. The Kashagan field presented particular challenges for its developers because it contains a high proportion of natural gas under very high pressure and contains large quantities of sulfur. Offshore platforms must also withstand extreme weather fluctuations in the northern Caspian Sea. Additional oil production could originate from the Karachaganak oilfield and gas condensate field onshore in northern Kazakhstan, near the border with Russia's Orenburg field. Karachaganak's oil reserves have been estimated to be between 8 and 9 Gbbl (1.1 and 1.2 Gt) of oil and gas condensate (U.S. Energy Information Administration, 2008c). In 2006, Kazakhstan had three oil refineries in operation.

Uranium.—In 2006, Kazakhstan produced 5,279 t of uranium (U_3O_8 content), which was 21% more than was produced in 2005. Of this amount, 3,010 t was produced by enterprises wholly owned by Kazatomprom, and the remainder was produced by joint ventures in which Kazatomprom was a part owner (Interfax Russia & CIS Metals & Mining Weekly, 2007g). Plans called for increasing uranium production by 31% to 6,937 t in 2007. Kazakhstan established three joint ventures with Russia to mine uranium in Kazakhstan, enrich it in Russia, and design and build nuclear powerplants to be sold to other countries (Interfax Mining and Metals Report, 2007h). Longer-term plans announced in May called for Kazatomprom to produce 17,500 t/yr of uranium by 2010, which would require placing 12 new mines into operation by 2009. This plan revised upwards Kazatomprom's production goal for 2010 because of a reassessment of world demand. Kazatomprom envisioned being the world's leading uranium producer by 2012. The company projected achieving a maximum output of 20,000 t/yr by 2016, which it could likely maintain until 2027 (Interfax CIS Mining & Metals Report, 2007h).

Outlook

Kazakhstan's long-term mineral development prospects remain promising. Oil production is expected to triple during the next decade and Kazakhstan was poised to become the world's leading uranium producer. Production growth had been taking place in practically all sectors of the mineral industry and is expected to continue in the next decade.

References Cited

Agenstvo Respubliki Kazakhstan po Statistiki [Agency for Statistics of the Republic of Kazakhstan], 2007, Industry: Agenstvo Respubliki Kazakhstan po Statistiki. (Accessed February 9, 2008, at http://www.stat.kz/RU/digital/Pages/Prom.aspx.)

Embassy of Kazakhstan in the United Kingdom of Great Britain and Northern Ireland, 2008, Kazakhstan—Mining sector: Embassy of Kazakhstan in the United Kingdom of Great Britain and Northern Ireland. (Accessed February 12, 2008, at http://www.kazakhstanembassy.org.uk/cgi-bin/index/68.)

Embassy of the Republic of Kazakhstan, 2008, London Stock Exchange welcomed Eurasian Natural Resources Corporation PLC to the main market on 12 December 2007: Embassy of the Republic of Kazakhstan, January 14. (Accessed February 6, 2008, at http://kazakhembus.com/index.php?mact=News,cntnt01,detail,0&cntnt01articleid=31&cntnt01returnid=72.)

Eurasian Natural Resources Corp., 2008a, Overview: Eurasian Natural Resources Corp. (Accessed February 6, 2008, at http://www.enrc.com/Operations/FERROALLOY DIVISION/Kazchrome/DisplayPage.asp?PageTitle=Overview.)

Eurasian Natural Resources Corp., 2008b, Sokolov-Sarbai Mining Production Association (SSGPO): Eurasian Natural Resources Corp. (Accessed February 6, 2008, at http://www.enrc.com/Operations/DisplayPage.asp?PageTitle=IRON ORE DIVISION (SSGPO.)

Federation of International Trade Associations, The, 2008, Kazakhstan—Economic indicators: The Federation of International Trade Associations, January. (Accessed February 9, 2008, at http://fita.org/countries/kazak.html?ma_rubrique=economie.)

Interfax Russia & CIS Metals & Mining Weekly, 2007a, Kazakhmys increases copper cathode output 2.6% in 2006: Interfax Russia & CIS Metals & Mining Weekly, issue 8, February 16-22, p. 20.

Interfax Russia & CIS Metals & Mining Weekly, 2007b, Kazakhstan aims to raise coal output to 145 mln tones by 2020: Interfax Russia & CIS Metals & Mining Weekly, issue 46, November 9-15, p. 27.

Interfax Russia & CIS Metals & Mining Weekly, 2007c, Kazakhstan aims to slash coal use 45% by 2024: Interfax Russia & CIS Metals & Mining Weekly, issue 41, October 5-11, p. 23.

Interfax Russia & CIS Metals & Mining Weekly, 2007d, Kazakhstan projects to ramp up coal production by 0.7% in 2007: Interfax Russia & CIS Metals & Mining Weekly, issue 3, January 12-18, p. 27.

Interfax Russia & CIS Metals & Mining Weekly, 2007e, Kazzinc edges up zinc output 0.7% in 2006: Interfax Russia & CIS Metals & Mining Weekly, issue 5, January 26-February 2, p. 32.

Interfax Russia & CIS Metals & Mining Weekly, 2007f, Shalkiyazinc boosts mining projections by third: Interfax Russia & CIS Metals & Mining Weekly, issue 17, April 20-26, p. 24.

Interfax Russia & CIS Metals & Mining Weekly, 2007g, Stepnogorsk mines 6% more uranium ore in 2006: Interfax Russia & CIS Metals & Mining Weekly, issue 8, February 16-22, p. 20, 21.

Interfax Russia & CIS Metals & Mining Weekly, 2007h, Uranium industry in Kazakhstan (part II): Interfax Russia & CIS Metals & Mining Weekly, issue 3, January 1-18, p. 13.

Interfax Russia & CIS Oil & Gas Weekly, 2007, Kazakhstan exports more than 57 MLN tons of oil in 2006: Interfax Russia & CIS Oil & Gas Weekly, issue 3, January 18-24, p. 30.

Kazakhmys PLC, 2007, Kazakhmys PLC production summary for the full year and the fourth quarter ended December 31 2006: Kazakhmys PLC, January 7. (Accessed February 4, 2008, at http://www.kazakhmys.com/media_reports.php.)

Kovzalenko, V.A., 2007, Syr'yevaya baza tsvetnoy metallurgii [The raw material base of nonferrous metallurgy], Tsvetnaya Metallurgiya [Nonferrous Metallurgy], no. 9, p. 19-25.

London Stock Exchange plc, 2006, Welcome stories—The London Stock Exchange is delighted to welcome ShalkiyaZinc N.V. to the main market: London Stock Exchange plc, December 14. (Accessed February 26, 2008, at http://www.londonstockexchange.com/prices-and-news/stocks/welcome/14-12-2006-shalkiyazinctomainmarket.htm.)

Materials World, 2007, The new iron ore age—Iron ore price trends: Institute of Materials, Minerals and Mining, September. (Accessed February 13, 2008, at http://www.iom3.org/materialsworld/feature-pdfs/sep07/the new iron age.pdf.)

Reuters, 2006, ShalkiyaZinc zinc concentrate sales up 56 pct in H1: Reuters, August 6. (Accessed February 26, 2008, at http://uk.reuters.com/article/UK_SMALLCAPSRPT/idUKL0649227220070806.)

Reuters, 2007, Kazchrome to launch chrome pellet plant in 2009: Reuters, October 31. (Accessed February 6, 2008, at http://www.kazakhembus.com/NB14-103107.html.)

Skorodumov, V.A., and Nikitina, T.I., [2007], Sostoyaniye i tendentsii razvitiya Rossiyskoy I zarubezhnoy titanovoy promyshlennosti [The current condition and development tendency of the Russian and foreign titanium industry]: Tsvetnaya Metallurgiya [Nonferrous Metallurgy], no. 8, p. 3-11.

U.S. Department of State, 2007, Kazakhstan, 2006 investment climate statement—Kazakhstan: U.S. Department of State. (Accessed January 28, 2008, at http://www.state.gov/e/eeb/ifd/2006/62359.htm.)

Digitized by Google

U.S. Energy Information Administration, 2008a, Kazakhstan—Background: U.S. Energy Information Administration country analysis brief, February. (Accessed February 7, 2008, at http://www.eia.doe.gov/emeu/cabs/Kazakhstan/Background.html.)
U.S. Energy Information Administration, 2008b, Kazakhstan—Natural gas: U.S. Energy Information Administration country analysis brief, February. (Accessed February 7, 2008, at http://www.eia.doe.gov/emeu/cabs/Kazakhstan/NaturalGas.html.)
U.S. Energy Information Administration, 2008c, Kazakhstan—Oil: U.S. Energy Information Administration country analysis brief, February. (Accessed February 9, 2008, at http://www.eia.doe.gov/cabs/Kazakhstan/Oil.html.)
United World, 2006, Kazakhstan: United World, April 27. (Accessed February 9, 2008, at http://www.unitedworld-usa.com/reports/kazakhstan/mining.asp.)

KYRGYZSTAN

During the Soviet period, Kyrgyzstan's mining industry was based on the extraction of antimony, mercury, rare-earth elements, and uranium. The country was the main producer of mined mercury and of mercury and antimony metal during the Soviet period. Following the dissolution of the Soviet Union, the country's leading mineral sector became the gold mining sector following the development of the Kumtor gold deposit by Canada's Cameco Corp., which concluded an agreement for the development of Kumtor with the Kyrgyzstan Government in 1994. In 2004, all Cameco's assets in Kumtor were transferred to a jointly owned Canadian company called Centerra Gold, Inc.

Minerals in the National Economy

In 2005, which was the latest year for which data were available, the mining sector contributed 10.2% of the country's GDP, 48.4% of the country's industrial output, and 11% of the tax revenue collected (Zubkov, 2007). Kumtor Gold Co., which was a subsidiary of Centerra, was the country's leading mineral producing enterprise; in 2006, it accounted for 4.3% of the country's GDP and 14.4% of its industrial output (Interfax Russia & CIS Metals & Mining Weekly, 2007c).

Production

In 2006, Kyrgyzstan experienced a 10.2% decrease in industrial production compared with that of 2005, which was primarily the result of decreased gold production from Kumtor Gold (Interfax Russia & CIS Statistics Weekly, 2007a). Antimony metal production appeared poised to resume at a much higher level at the end of 2006 with the resolution of raw material supply problems. Data on mineral production are in table 11.

Structure of the Mineral Industry

Besides Centerra, the country's main mining enterprises were the Kadamzhay antimony mining and metallurgical complex, the Khadarkan mercury mining and metallurgical complex, and the Makmal gold mining complex. Table 12 is a list of Kyrgyzstan's major mineral industry facilities.

Mineral Trade

In 2006, mineral products played a large role in Kyrgyzstan's exports. Precious metals and their products comprised 27.3% of total exports for the first 11 months of the year; of exports of mineral products, 21.7%; and of products made from stone, gypsum, cement, glass, and its products, 5.9%. Kyrgyzstan's main imports were mineral products composed of coal, natural gas, and petroleum refinery products, which accounted for 32% of total imports for the first eleven months of the year and nonprecious metals and their products, which accounted for 6.1% of total imports (Interfax Russia & CIS Statistics Weekly, 2007b).

Commodity Review

Metals

Antimony.—The Kadamzhay antimony mining and metallurgical complex was a vertically integrated antimony production complex that mined the Kadamzhay and the Terek deposits. The complex contained two mines (the Kadamzhay and Terek-Sayskiy), beneficiation plants, and the Kadamzhay metallurgical plant that produced metallic antimony and compounds. With the development of large antimony reserves in Russia and Tadzhikistan, ore production at Kadamzhay decreased. In 2004 and 2005, the Kadamzhay complex was not operating, and in 2005, it was privatized. The new owners engaged in investing in technically reequipping the plant and in infrastructure for the mines. From mid-2005 until November 2006, Kadamzhay ceased producing its core products because it had not been able to obtain raw material supplies from the Anzob mining and beneficiation plant in Tajikistan, which had been its main raw material supplier.

To resolve its raw material supply problem, in 2006, the Kadamzhay metallurgical plant oriented its production to processing concentrate from Russia. In the fall, Kadamzhay began receiving its supplies of raw materials from the Chita region in Russia, which would enable it to resume stable operations. Plans called for Kadamzhay to produce between 3,000 and 5,000 t/yr of antimony metal and its compounds.

Kadamzhay, despite more than 70 years of development, still had a large quantity of reserves in both deposits that had not been mined and in other deposits that the complex was keeping in reserve. The company determined that it was necessary to reevaluate these reserves on the basis of market economy criteria rather than the method that had been used in Soviet times. In the summer, ATF Invest, a subsidiary of the ATF Bank of Kazakhstan, purchased a 70.4% stake in Kadamzhay (Interfax Russia & CIS Metals & Mining Weekly, 2007a; Zubkov, 2007).

Gold.—In 2006, Kyrgyzstan experienced a 36% decline in gold production to 10.721 t. Gold was the country's main mineral commodity produced, in terms of value. Plans had called for producing 12.795 t. Kumtor Gold, which was the country's leading gold producer, reduced output by 39.5% to 9.443 t, which was 16.1% less than planned output. The decline in gold production at Kumtor Mine was caused mainly by a pit wall collapse at the mine in July, but was also the

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result of the company having to mine lower-grade ore; the ore graded 1.5 grams per metric ton (g/t) gold compared with the higher-grade ore previously mined, which graded 2.5 g/t gold. In 2007, plans called for Kumtor Gold to increase gold production to 15 t (Interfax Russia & CIS Metals & Mining Weekly, 2007b).

Mercury.—The Khaydarkan mercury mining and metallurgical complex mined the Khaydarkan and the Novoye deposits. Remaining reserves at the Khaydarkan deposit were reportedly 11,000 t, and at the Novoye deposit, 5,500 t. These deposits also reportedly contain 1.071 Mt of fluorspar and 107,700 t of antimony reserves. The Khaydarkan complex contained two underground mines, a beneficiation plant, and metallurgical processing facilities. Khaydarkan was producing about 500 to 600 t/yr of mercury in recent years, but this amount fell to 304 t in 2005. Calcined antimony produced at Khaydarkan as a result of processing antimony-fluorspar concentrate was sent to Kadamzhay for processing, and the fluorspar concentrate was sold to consumers. The potential for future expansion of mercury production at Khaydarkan was limited owing to the limited quantity of primarily mercury ore reserves. The majority of the remaining reserves at Khaydarkan were of complex ores from which it was more difficult to extract mercury. Plans called for the Government to privatize Khaydarkan in 2007 (Zubkov, 2007).

Industrial Minerals

Rare Earths.—Open pit mining of rare-earth metals had taken place in Kyrgyzstan from 1960 through 1992 at the Kutessai II deposit, and the majority of rare-earth metal reserves there still remained. Of the remaining rare-earth metal reserves, 54.5% were of the cerium group and 43.7% were of the yttrium group. The complex had produced up to 120 types of rare-earth metal products. During the beneficiation process, lead and molybdenum concentrates also were produced and sold. In 2006, a private firm purchased the license to continue developing this deposit. It was conducting a reevaluation of the reserves to determine the potential for the economic production of rare-earth metals (Zubkov, 2007).

Outlook

In the short term, the economic well-being of the country as well as that of the mineral sector depend, in part, on the revival of gold production at Kumtor Mine. Centerra planned to increase production by between 48% and 52%, or from 9.4 t in 2006 to between 14 and 14.3 t in 2007, by mining higher-grade ore, which would likely bring gold output at Kumtor more in line with its historic average levels and consequently bolster the country's GDP (Interfax Russia & CIS Metals & Mining Weekly, 2007c).

References Cited

Interfax Russia & CIS Metals & Mining Weekly, 2007a, Kadamjai antimony works produces 170 tonnes of antimony in Jan: Interfax Russia & CIS Metals & Mining Weekly, issue 6, February 9-15, p. 19.

Interfax Russia & CIS Metals & Mining Weekly, 2007b, Kyrgyzstan sees gold output plummet 36% in 2006 Interfax Russia & CIS Metals & Mining Weekly, issue 5, January 26-February 1, p. 45.

Interfax Russia & CIS Metals & Mining Weekly, 2007c, Kyrgyzstan's Kumtor Mine could boost gold production 50% in 2007: Interfax Russia & CIS Metals & Mining Weekly, issue 6, February 9-15, p. 14.

Interfax Russia & CIS Statistics Weekly, 2007a, Industrial production in Kyrgyzstan down 10.2% in 2006: Interfax Russia & CIS Statistics Weekly, issue 6, January 27-February 2, p. 6.

Interfax Russia & CIS Statistics Weekly, 2007b, Kyrgyzstan's foreign trade in January-November 2006: Interfax Russia & CIS Statistics Weekly, issue 7, February 2-9, p. 8.

Zubkov, V.P., 2007, Syr'yevaya baza, sostoyaniye i perspektivy razvitya gornopromyshlennogo kompleksa Kykrgyzskoy Respubliki [The raw material base, condition, and perspectives for the development of the mining-industrial complex of the Kyrgyz Republic]: Gornyy Zhurnal [Mining Journal], no. 10, p. 38-42.

MOLDOVA

Moldova had a small mineral industry that was primarily engaged in the mining and production of industrial minerals and products, including cement, dimension stone, gypsum, limestone, industrial sand, and sand and gravel (table 13). Moldova had a steel minimill in Ribnita, the Moldova Steel Works, which had the capacity to produce more than 1 Mt/yr of crude steel and 960,000 t/yr of rolled products (table 14).

The extractive industries accounted for less than 2% of the value of the country's industrial production (Statistica Moldovei, 2005, 2006). The country has numerous deposits of industrial minerals and small oil and gas reserves, which it hoped to develop with the aid of foreign investment (Austrian Energy Agency, 2009). Practically all mineral production enterprises were stock companies that had the participation of foreign enterprises (Zhalalite and others, 2007).

In 2005, more than 70% of the value of the country's mineral imports came from the CIS. Moldova did not have any oil refineries and was entirely dependent on imports of petroleum products. Almost all these imports come from Romania and Ukraine, although in the 1990s, almost all had come from Russia. Moldova imported all the natural gas it consumed from Russia (Austrian Energy Agency, 2009).

Moldova had been experiencing a continuous shortage of high-strength gravel and stone. The country was mining granite at only one deposit (the Kosoutskoye), which in 2006 produced 130,000 cubic meters—an amount that was not adequate to meet Moldova's requirements for high-strength construction stone. Also in 2006, out of 125 explored sand and gravel deposits, 71 were being mined with an output of 925,000 cubic meters of sand and gravel. Although this amount was three times greater than the amount produced in 2000, it was significantly less than the country was producing in 1990. Of the 105 known deposits containing reserves of clay and loam suitable as raw material for bricks, tiles, and ceramic drainage pipes, 11 deposits of ceramic raw materials were under development. Of 16 explored deposits of porous clay filler (keramzit) for cement, two were under development (Zhalalite and others, 2007).

The country's steel mill was located in the region of Transnistria (officially Pridnestrovie), which is a territory within the internationally recognized boundaries of the Republic of Moldova. Transnistria declared its independence as a separate republic of the Soviet Union on September 2, 1990. Although the separatist Pridnestrovian Moldovan Republic (PMR) had exercised de facto control over most of Transnistria,

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its independence had not been recognized by Moldova or internationally. The steel mill was Transnistria's leading industry and accounted for about 50% of the region's budget revenues. Steel was one of Transnistria's major exports.

In 2006, steel output at the Moldova Steel Works decreased by about 32.5% to 675,400 t. The Moldova Steel Work's functioning was impaired by a number of factors, which included a halt in supplies of Russian gas to Moldova, the introduction of a Ukrainian customs duty of 30 euros per metric ton on scrap metal, and a shut down in operations in October owing to renovation. Efforts were underway to resolve the problem of scrap supply in 2007 by accumulating stocks of scrap and by setting up firm commitments with scrap suppliers. The steel works exported about 75% of its output (Interfax Mining and Metals Report, 2007).

Production

Data on mineral production are in table 13.

Structure of the Mineral Industry

Table 14 is a list of major mineral industry facilities in Moldova.

Outlook

The mineral industry of Moldova appears likely to continue to be centered on the production of industrial minerals and steel. The country has very limited resources of hydrocarbons and iron ore, and its only significant mineral resources are of industrial minerals used in the cement, chemical, construction materials, food processing, and glass industries. For Moldova to significantly increase production of industrial minerals, it would have to significantly increase its investment in exploration, which would probably require establishing additional cooperative projects with foreign partners (Zhalalite and others, 2007).

References Cited

Austrian Energy Agency, 2009, Energy in Central and Eastern Europe, supply: Energy Sources, January 16. (Accessed January 23, 2007, at http://www.enercee.net/moldova/energy-sources.html.)

Interfax Mining and Metals Report, 2007, Moldova steel output down 36.6% in 2006: Interfax Mining and Metals Report, issue 01-02, December 29, 2006–January 11, 2007, p. 26–27.

Statistica Moldovei, 2005, Cu privire la activitatea industriei Republicii Moldova in anul 2005: Statistica Moldovei. (Accessed January 23, 2007, at http://www.statistica.md/statistics/dat/735/ro/Industria_anul_2005.pdf.)

Statistica Moldovei, 2006, Cu privire la activitatea industriei Republicii Moldova in anul 2006: Statistica Moldovei. (Accessed January 23, 2007, at http://www.statistica.md/statistics/dat/902/ro/Industria_anul_2006.pdf.)

Zhalalite, R.P., Il'inskiy, Y.F., and Bilyk, A.N., 2007, Sostoyaniye mienral'no-syr'yevoy bazy Respubliki Moldova [The condition of the mineral-raw material base of the Moldovan Republic]: Gornyy Zhurnal [Mining Journal], no. 10, p. 43-46.

RUSSIA

Russia is one of the world's leading mineral producing countries and accounts for a large percentage of the FSU's production of a range of mineral products, including industrial minerals, metals, and mineral fuels. In 2006, Russia ranked among the leading world producers or was a large producer of such mineral commodities as aluminum, arsenic, asbestos, bauxite, boron, cadmium, cement, coal, cobalt, copper, diamond, fluorspar, gold, iron ore, lime, lithium, magnesium compound and metals, mica (scrap, sheet, and flake), natural gas, nickel, nitrogen, oil shale, palladium, peat, petroleum, phosphate, pig iron, potash, rhenium, silicon, sulfur, titanium sponge, steel, tin, tungsten, and vanadium.

Minerals in the National Economy

The mineral raw material sector in Russia produced about 30% of the country's GDP and contributed about 70% of the country's budget revenues (Chanturiya, 2007). Analyses from the International Monetary Fund and The World Bank have estimated that the oil and gas sector accounted for about 20% of the country's GDP (U.S. Energy Information Administration, 2007a). The metallurgical sector accounted for about 5% of the GDP, 18% of industrial production, and 15% of exports (Parkhomenko, 2007). In 2006, 1,036,000 workers that made up 1.5% of the labor force were engaged in mining (Rossiya v Tsifrakh 2007, 2008a). Russia, however, ranked among the lower 20% of mineral extracting countries in its per capita consumption of metals (Chanturiya, 2007). Domestic consumption of mineral products was increasing, however. In 2006 in the ferrous sector, domestic demand for rolled steel increased by 16.5%, and domestic demand for steel pipes increased by 27.8%; in the nonferrous sector, domestic demand for aluminum increased by 3.8%; that for copper, by 2.7%; and that for nickel, by 2.9% (Parkhomenko, 2007).

The growth in domestic demand was attributable to increased demand in the domestic machine manufacturing, transport, and fuel sectors. Owing to the need of these sectors for high-quality metals or for a specific assortment of products not produced domestically, such as zinc-coated and alloyed steels and a variety of steel pipes, these industries continued to import a percentage of these metal products (Nekrasov, 2007).

Government Policies and Programs

Amendments to Russia's law on the use of subsurface resources were ratified on January 31, 2007. These amendments set criteria for deposits containing strategic commodities and limited the rights of foreigners to invest in a controlling stake in such deposits if they have not yet been developed with foreign participation. Strategic deposits include oilfields with more than 70 Mt of reserves, natural gas fields with more than 50 billion cubic meters of reserves, copper deposits with more than 500,000 t of copper contained in the ore, and gold deposits with more than 50 t of gold contained in the ore. All mineral deposits of diamond, pure quartz, and uranium are considered strategic. These new amendments set criteria for strategic deposits that are much lower for oilfields and gasfields than criteria proposed earlier and encompass, therefore, a much larger number of these fields—about 30 oilfields and 40 gasfields. For copper, three deposits, including the Udokan deposit, would be listed as strategic, and for

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gold, the Sukhoy Log deposit would be listed as strategic (Interfax Russia & CIS Metals & Mining Weekly, 2007n).

United Company RUSAL (formerly RUSAL) stated that it understands the importance of climate change to future generations and set a goal to reduce emissions from its smelters by a total of 50% by 2015. It planned to spend $1.4 billion by 2013 for this purpose. All smelters were to be modernized to conform to one standard. RUSAL was planning to have its operations be carbon neutral through improved energy efficiencies and through recycling. RUSAL was deriving about 80% of its electricity from hydroelectric sources, and developing hydroelectric projects was a prominent feature of RUSAL's development plans. RUSAL was also devoting substantial resources to researching and developing more environmentally friendly ways to use coal. By increasing recycling, RUSAL would save substantial energy as remelting aluminum requires only 10% of the energy used to produce primary aluminum. RUSAL claimed that it was the first major Russian company to take these steps and hoped that it would set an example for other Russian companies (Interfax Russia & CIS Metals & Mining Weekly, 2007h).

Production

Russia, according to calculations by the Center for Strategic Research at Moscow State Mining University, was the leading country in the world in the number of minerals that it mined (Chanturiya, 2007). In 2006, in the mineral sector (with a few exceptions for such commodities as gold, magnesium, tin, and tungsten), production increases were registered for practically all ferrous and nonferrous metals and fuels (table 15; Nekrasov, 2007).

Structure of the Mineral Industry

Russia has more than 100 large mining and beneficiation and mining and metallurgical enterprises that mine and process ferrous and nonferrous metals. The country had 238 coal mining enterprises, which mined coal at 134 open pits and 104 underground mines. Coal processing was performed at 42 beneficiation plants, 27 beneficiation installations, and 17 sorting stations (Chanturiya, 2007; Linyev and others, 2007). The leading enterprises in the nonferrous enterprise sector included RUSAL for aluminum and OJSC MMC Norilsk Nickel for cobalt, copper, gold, nickel, platinum-group metals (PGM), and other byproduct metals. In the ferrous metals sector, the major metallurgical enterprises were the EvrazHolding, the Lipetsk, the Magnitogorsk, the Mechel, the Metallinvest, and the Severstal' steel mills (Parkhomenko, 2007). Table 16 is a list of major mineral industry facilities in Russia.

Mineral Trade

In 2006, exports of mineral products were valued at $199 billion, of which $178.7 billion was exported outside the CIS and accounted for 65.8% of the total value of exports and 68.7% of the total value of exports outside the CIS. The value of exports in 2006 was significantly higher than in 2005 when exports of mineral products were valued at $156 billion and exports outside the CIS were valued at $140.9 billion and accounted for 64.6% of total exports and 67.5% of exports outside the CIS. Russia's exports of natural gas and oil and of ferrous and nonferrous metals accounted for between 7% and 20% of the total volume of world exports of these products (Chanturiya, 2007). Oil and gas exports accounted for more than 60% of export revenues and 30% percent of all foreign direct investment (FDI) in the country. Russia relied heavily on oil and natural gas exports, and fluctuations in the world price of oil could have a large effect on its economy (U.S. Energy Information Administration, 2007a).

Of Russia's total exports, those of ferrous and nonferrous metals ranked second to mineral fuels and accounted for 15% of the total value of exports. In 2006, however, the total value of ferrous and nonferrous metals as a percentage of the country's total exports decreased somewhat compared with that of 2005. In 2006, Russian metal exporters continued to face trade sanctions, with more than 38 trade sanctions still in place in such countries as Argentina, Australia, countries of the European Union (EU), India, Mexico, Turkey, the United States, and Venezuela. Such restrictions were affecting both ferrous and nonferrous exports. In 2006, Russia still had not achieved acceptance to the World Trade Organization, which, if such membership is achieved, could remove a number of the trade barriers that were erected against Russian metal exports (Nekrasov, 2007).

In 2006, Russian exports of ferrous metals totaled 45.96 Mt and were valued at $17.85 billion (Interfax Russia & CIS Metals & Mining Report, 2007a). In the ferrous sector in 2006, Russia exported 22.9 Mt of iron ore and concentrate, which was a 25.8% increase in exports compared with those of 2005; 6.1 Mt of pig iron, which was a 15.3% increase; and 19.889 Mt of steel products, which was about a 1% increase (Rossiya v Tsifrakh 2007, 2008b). In 2006, Russia increased its aluminum exports by 10.1% to 4.064 Mt, but copper exports decreased by 12.9% to 271,000 t, and nickel exports decreased by less than 1% to 259,800 t. In the fuel sector in 2006, Russia exported 91.4 Mt of hard coal, which was a 14.5% increase in exports compared with those of 2005; 248 Mt of crude oil, which was about a 2% decrease; 103 Mt of refinery products, which was a 6% increase; and 203 billion cubic meters of natural gas, which was a 2.4% decrease (Rossiya v Tsifrakh 2007, 2008b).

Only a small percentage of Russian exports of mineral products went to countries of the CIS. The leading consumer of Russian energy products was the EU, which accounted for 63% of Russia's total oil exports and 65% of its gas exports. Russia was the EU's single leading supplier of oil and gas and provided 27% of total EU oil imports and 44% of total EU natural gas imports (Moscow News, 2007; Rossiya v Tsifrakh 2007, 2008b).

Commodity Review

Metals

Aluminum.—RUSAL was Russia's leading domestic aluminum producing company and SUAL Group was the second

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ranked domestic aluminum producer and the leading domestic bauxite producer. Together, these two firms controlled all Russian aluminum, alumina, and bauxite production enterprises. Plans called for RUSAL to merge with SUAL and with the Switzerland-based Glencore International AG to become the United Company RUSAL, which would then become the global leader in aluminum production. The merger was completed in March 2007.

In 2006, RUSAL was investing to expand and modernize its production facilities. It was engaged in commissioning the Khakaz aluminum smelter with a capacity of 300,000 t/yr. The Khakaz aluminum smelter was the first aluminum production facility built in Russia in the past 20 years. The first batch of aluminum was manufactured at the Khakaz smelter in December 2006. The total amount of investment in the project exceeded $750 million. The Khakaza smelter was projected to reach its installed capacity in October 2007. It had 600 employees (United Company RUSAL, 2007).

In 2006, RUSAL began work to construct a 750,000-t/yr greenfield aluminum smelter in Taishet, which is a small town located near Irkutsk. The construction was expected to be completed in 2011. RUSAL also was carrying out large-scale modernization of the Irkutsk aluminum smelter, which was commissioned in 1962. After commissioning of a new potline no. 5, the total capacity of the smelter would increase by 50% to 450,000 t/yr. The first stage of potline no. 5 was to start production in 2007 and full production capacity for potline no. 5 was to be achieved in 2008. Construction of potline no. 6 was planned after the construction of potline no. 5. When the planned construction of potline no. 6 is completed in 2009, the smelter's production capacity would reach 500,000 t/yr (United Company RUSAL, 2008).

Plans for RUSAL also called for modernizing the Sayanogorsk aluminum smelter in 2006 to increase the output of aluminum and alloys and to modernize the Nikolayev alumina refinery in Ukraine to increase the output to 1.6 Mt/yr of alumina. RUSAL also planned to continue to expand production capacity at the Achinsk alumina refinery, increasing its output to 1.1 Mt/yr of alumina (United Company RUSAL, 2008).

Included in RUSAL's investment project portfolio was the Komi Aluminum project, which was initiated by SUAL. The project entailed the development, construction, and operation of a bauxite-alumina complex in the Komi Republic, which would be supplied by ore from the Middle Timan bauxite deposit that was under development and would include an alumina refinery to be constructed at Sosnogorsk. The design capacity of the complex was 6.5 Mt/yr of bauxite and 1.4 Mt/yr of alumina. From 1998 until 2006, mining at the Komi project was taking place only at open pit no. 2, but in January 2006, open pit no. 3 was commissioned, and in June, open pit no. 1 was commissioned. Bauxite production at Komi had increased from 63,479 t in 1998 to 2,010,864 t in 2005. Plans called for increasing bauxite production at Komi to 6.5 Mt/yr in the 2009-10 period. Construction of the alumina plant in Sosnogorsk had not begun, and the functioning of the alumina plant would depend on its obtaining an uninterrupted supply of bauxite from the Komi project when it has achieved its design capacity to produce 6.5 Mt/yr of bauxite. The completion of the Komi project would considerably reduce the Russian aluminum industry's dependence on foreign countries for bauxite and alumina (Broneyoy and others, 2007).

Antimony.—Russia reportedly was second in the world to China in antimony reserves. Russia's antimony reserves are located primarily in the Sakha (Yakutiya) Republic. These reserves are comparatively rich in antimony content with ores that grade between 20% and 25%. Practically all explored reserves are located in the Sarylakh and Sentachun deposits, which contain reportedly 200,000 t of antimony reserves; these reserves account for 83% of the country's total reserves of almost 240,000 t, which are contained in nine deposits. Ore from the Sarylakh deposit has an average grade of 13.2% antimony, which can be beneficiated to obtain a concentrate containing 60% antimony. Ore from the Sentachun deposit has an average grade of 28.7% antimony and the concentrate produced contains 58.9% antimony. Ore from these deposits was processed using a gravitation-flotation beneficiation method (Solozhenkin, 2007).

Beryllium.—The country's beryllium consumption was between 2 and 3 t/yr and was projected to increase to between 10 and 12 t/yr by 2010. Reserves of beryllium are located in 27 deposits and subeconomic (zabalansovye) reserves were located in an additional 8 deposits. Most of these deposits have complex pegmatitic ore, and beryllium would be a byproduct. The most prospective deposit was reportedly the Yermakovskoye fluorite-bertrandite-phenacite deposit in Buryatia, the development of which would fully satisfy the country's future demand for beryllium (Kurkov and Kotova, 2007).

Copper.—At Russia's leading copper producing enterprise, Norilsk Nickel, copper metal production fell slightly in 2006 to 425,000 t compared with 427,000 t in 2005, which was in keeping with targets that the company had set. Production of copper was targeted to remain in the range of from 422,000 to 427,000 t in 2007 (Interfax Russia & CIS Metals & Mining Weekly, 2007f). Based on the results of an independent audit conducted in accordance with the standards of the Joint Ore Reserves Committee (JORC), proven and probable reserves of copper contained in deposits on the Kola and the Taymir Peninsulas exceeded 9 Mt (MMC Norilsk Nickel, 2007).

The Urals Mining and Metallurgical Company (UMMC), which was Russia's second ranked copper producer with about 40 enterprises in 11 regions managed by UMMC Holding, had about a 40% share of the domestic copper cathode market. In 2006, UMMC produced 354,258 t of cathode copper, which was about equal to its 2005 production level, and it planned to increase production in 2010 by 41% to 500,000 t. In 2006, UMMC had the capacity to produce 360,000 t/yr of copper cathodes (Interfax Russia & CIS Metals & Mining Weekly, 2007q, r). Plans called for reconstruction of an electrolysis unit, which would enable UMMC to increase copper cathode production by 150,000 t/yr (Interfax Russia & CIS Metals & Mining Weekly, 2007s).

The Russian Copper Company (RCC), which was the country's third ranked copper producer with production facilities centered in the Ural Mountains, increased production of copper cathode in 2006 by 33% to 164,000 t. RCC combines 11 upstream and downstream enterprises, which mine and process copper ores and produce copper products. In 2006, RCC's share

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of the Russian market rose to 18% from 3%, and its share of the world market was 1%. Plans called for RCC to increase copper cathode production to 185,000 t using its own raw materials. Cathode production capacity was increased at RCC's Kyshtym refinery in the Chelyabinsk region and at its new Novgorod refinery. RCC's copper cathode production capacity increased by 60,000 t/yr in 2006. RCC planned to increase copper cathode output to 290,000 t in 2010. In 2007, RCC planned to add a third electrolytic plant at Kyshtym with a capacity of 100,000 t/yr; the first 50,000 t of capacity would be added in the late spring and the remaining 50,000 t would be added in December (Interfax Russia & CIS Metals & Mining Weekly, 2007l).

Reserves were being reevaluated at the Udokan copper deposit in Chita oblast', which is one of the largest copper deposits in the area of the FSU. The reevaluation was to be completed at the end of 2009. It was being conducted by the geological firm Giprotsvetmet with the participation of Norilsk Nickel, which was one of the companies contending for rights to develop the deposit. Owing to the size of its reserves, Udokan was being classified as a strategic deposit, which means that foreign companies would not be able to have a controlling interest in the ownership of the deposit (Interfax Russia & CIS Metals & Mining Weekly, 2007o).

Gold.—Gold output in 2006 in Russia, including secondary recovery, decreased by 2.2% and totaled 164.3 t. Mine output of primary gold, which does not include byproduct gold, decreased by 2.9% to 147.6 t, but secondary gold production increased by 2.1% to almost 5 t. Gold mine output was reduced mainly because of a decline of 9.6 t in placer gold production (Interfax Russia & CIS Metals & Mining Report, 2007b). Almost the country's entire production of gold (98.9%) took place in the 14 leading gold mining regions, which each had an annual output of more than 1 t. The leading gold producing region in 2006 was Krasnoyarsk Kray, with output of 31.491 t; it was followed by the Sakha (Yakutiya) Republic, with 19.920 t; Magadan Oblast', 17.288 t; Khabarobsk Kray, 15.742 t; Irkutsk Oblast', 14.542 t; and Amur Oblast', 14.491 t. The remaining eight major gold producing regions had outputs of less than 7 t in 2006. In 2006, the Kamchatka Oblast' was included on the list. Among those regions previously on the list, in only two, Krasnoyarsk Kray and the Sakha (Yakutiya) Republic, did production increase. Particularly large production decreases in output occurred in Khabarovsk Kray and Magadan Oblast' (Brayko and Ivanov, 2007).

Production fell primarily because of reduced output from placer deposits where reserves were being depleted and production capacity was being transferred to mine hard rock deposits. Depletion of reserves at placer mines also was attributed in part to a lack of resources by the small companies mining these deposits to conduct necessary exploration. In 2006, 62 t was produced from placer deposits, which was far less than the amount produced from placers between 1976 and 1990, when production ranged between 110 and 130 t/yr (Brayko and Ivanov, 2007).

In 2006, the country's leading gold mining company remained the OAO Polyus Zoloto, which produced 37.548 t of gold compared with 32.322 t in 2005. It mined gold in five major gold producing regions. The total increase in extraction from hard rock mining enterprises in 2006 was 2.6 t, as production increases at some enterprises were offset by decreases at others. Extraction of gold by foreign-controlled enterprises decreased by 10% in 2006. The Krasnoyarsk nonferrous metals plant remained the country's leading gold refinery, processing 48.9% of mined gold (Brayko and Ivanov, 2007).

Iron and Steel.—In 2006, Russia increased output of crude steel by 6.8% to 70.766 Mt, and output of rolled steel, by 6.5% to 58.212 Mt. Russia increased steel pipe output by almost 19.5% to 7.974 Mt. Oxygen converters were used to produce about 59% of total steel output and electric furnaces were used to produce about 21%, which was an increase of 6.1% in the production of steel from oxygen converter furnaces and an increase of 10.6% for steel produced in electric furnaces. The percentage of steel produced in open-hearth furnaces fell to 19.9% of total steel output. The amount of steel produced by continuous casting increased to 68.4% in 2006 when 48.4 Mt was produced by continuous casting, from 66% in 2005. All Russia's steelmaking plants increased their output of crude steel in 2006 except one, and all but two increased their output of rolled steel (Interfax Russia & CIS Metals & Mining Weekly, 2007i, k; Nekrasov, 2007).

In 2006, 44.6% of total steel production occurred at the three leading steel mills (Magnitogorsk, Novolipetsk, and Severostal). The rate of investment in the steel sector varied greatly among enterprises. For the three leading steel mills, the average rate of investment was $32 per metric ton of steel produced; for the six in the second-tier group of steel mills, the average rate of investment was $15 per metric ton of steel, and for the third group of smaller steelmakers, the average rate of investment was only between $7 and $8 per metric ton (Yuzov and others, 2007). Plans called for completely eliminating open-hearth steel production by 2010, which would necessitate a change in the type of refractory raw materials in use and could increase the demand for less conventional refractory raw materials, such as andalusite, bauxite, kyanite, sillimnanite, and zirconium (Shevelyev and Tokhtas'yev, 2006).

Iron Ore.—In 2006, Russia's iron ore mining industry achieved a 7.3% growth in output to 102 Mt compared with almost 97 Mt in 2005. The growth was fueled by an increase in domestic demand for pig iron and also by the increased demand for iron ore on the world market. The major iron ore producers remained the enterprises in the Kursk Magnetic Anomaly (KMA) and in the North West region, which produced 56% and 17%, respectively, of total output. Growth was specifically notable at the Lebedi and the Mikhaylovka mining and beneficiation complexes in the KMA and at the Korshunovo mining and beneficiation complex in the North West region (Nekrasov, 2007).

Russia's reported iron ore reserves are located in 172 deposits, 53 of which were being mined. The basic iron ore reserves are composed mainly of magnetite and hematite-magnetite ores with the average iron content in the magnetite ores ranging between 31% and 35% and in the hematite ores, between 40% and 50%. The differing ore types require specialized technologies to beneficiate in order to produce a marketable product (Avdokhin and Gubin, 2007).

Lead and Zinc.— UMMC, which was Russia's second ranked copper producer with facilities centered in the Ural

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Mountains, planned to increase zinc metal production to 250,000 t in 2012, or by 184%. UMMC produced about 88,000 t of zinc in 2006. Plans called for UMMC to construct a 140,000- to 150,000-t/yr-capacity zinc smelter in the Sverdlovsk region, which would be capable of processing all UMMC's raw materials. The new smelter was to be commissioned in the summer of 2008. Plans called for UMMC to produce 87,500 t in 2007 and 2008 and to increase production to 110,000 t in 2009. In 2006, UMMC processed most of its zinc concentrate at its zinc refinery in Vladikavkaz, which had a capacity to produce 90,000 t/yr (Interfax Russia & CIS Metals & Mining Weekly, 2007r).

In 2006, UMMC produced 42,000 t of lead, with production of 28,000 t at its Elektozinc enterprise in Vladikavkaz and 14,000 t at its Uralelektromed enterprise. UMMC planned to increase production at Elektrozinc by 85% to 50,000 t by 2010 with output in 2007 targeted at 30,000 t (Interfax Russia & CIS Metals & Mining Weekly, 2007d).

Siberian Polymetals, which was a subsidiary of UMMC, planned to commission the Zarechenskiy Mine in June, which would increase polymetallic ore production by 100,000 t/yr in the first stage; the design capacity of 300,000 t/yr of ore would be reached in 2009. In 2007, the new mine was projected to produce 30,000 t of ore. Reserves were reportedly 1.3 Mt of ore (Interfax Russia & CIS Metals & Mining Weekly, 2007e).

Magnesium.—Russia had two major magnesium producing enterprises—the Avisma titanium-magnesium plant in Berezniki in the Perm region, which produced magnesium metal and compounds and was a subsidiary of titanium producer VSMPO-Avisma, and the Uralkaliy potash and magnesium mining and beneficiation plant, which was also located in the Ural Mountains. In 2006, Avisma, which produced magnesium from carnallite ore mined by the Sylvinit mining enterprise and processed at Uralkaliy, reduced magnesium metal production to 15,800 t from 23,000 t in 2005, or by 33.9%. The decrease in output took place because of low profit margins and the inability of magnesium from Avisma to complete on world markets. Production also fell below the targeted amount of 16,000 t owing to an accident at raw material supplier Uralkaliy at the end of 2006. It was envisaged that raw materials supply would stabilize in 2007 and that Avisma would be able to honor all existing contracts to supply magnesium (Interfax Russia & CIS Mining & Metals Weekly, 2007v).

Magnesium Compounds.—The Magnezit Group was Russia's leading magnesite producer and had a 67% share of the Russian refractories market and a 60% share of the CIS market. It included the Kyshtym refractories plant, the Magnazit Works, Sibirsky Magnezit, two plants in China, and two sales divisions. The Magnezit Group operated the Karagayskiy open pit mine and the Magnezitovaya underground mine. The Karagayskiy open pit was near depletion and development of the Yelnichnoye deposit within the Satkinaya group of deposits was underway to replace production from Karagayskiy. The Magnezit Group also had a license to develop the Goluboye deposit in the Krasnoyarsk region, which reportedly has explored reserves of 15.5 Mt. A planned mine would have the capacity to produce 200,000 t/yr of raw magnesite and was scheduled to achieve capacity production in 2008. Planning was underway for construction of a plant that would have the capacity to produce 95,000 t/yr of roasted magnesite from this ore; the plant was scheduled to be completed in 2009. The Magnezit Group reportedly had 150 Mt of proven reserves in its deposits in the Chelyabinsk region (Interfax Russia & CIS Metals & Mining Weekly, 2007c).

Nickel.—In 2006, Norilsk Nickel, which was the world's leading nickel producer and which had mining and processing operations on the Kola Peninsula in the northwestern part of the country and on the Taymyr Peninsula in Siberia, produced 244,000 t of nickel metal products compared with 243,000 t in 2005, which was in keeping with the company's production targets. Norilsk Nickel's mining operations on the Taymyr Peninsula consisted of seven mines that extracted mixed sulfide ores with varying contents of cobalt, copper, gold, nickel, PGM, and other ore constituents. Based on the results of an independent audit conducted in accordance with the standards of the JORC, proven and probable reserves of nickel on the Kola and the Taymyr Peninsulas exceeded 6 Mt. Norilsk Nickel operated four mines on the Kola Peninsula that extracted disseminated sulfide ores containing copper, nickel, and other ore constituents. Norilsk Nickel had ore processing and metallurgical enterprises at both locations, but the refining of PGM concentrates from Norilsk Nickel was outsourced under a tolling agreement to the Krasnoyarsk nonferrous metals plant (MMC Norilsk Nickel, 2007).

Norilsk Nickel's plans for 2007 called for producing between 243,000 and 248,000 t of nickel products (Interfax Russia & CIS Metals & Mining Weekly, 2007f). In 2006, development of the Severny-Gluboky underground mine on the Kola Peninsula continued. The mine had a planned annual capacity of 6 Mt of disseminated ore. Commissioned capacity at Severny-Gluboky was 1 Mt/yr of ore in 2006. Longer-range plans for Norilsk Nickel called for increasing the total annual ore production on the Kola and the Taymyr Peninsulas from 21.8 Mt in 2006 to 26 Mt by 2015 (MMC Norilsk Nickel, 2007).

Ore production on the Taymyr Peninsula was projected to increase to 18.5 Mt in 2015 from 14.127 Mt in 2006, with the production of nickel-rich ore (grading 2.5% nickel, 2.25% copper, and 5 to 100 g/t PGM), cuprous ores (grading 0.2% to 2.5% nickel, 1% to 15% copper, and 5 to 50 g/t PGM), and disseminated ores (grading 0.2% to 1.5% nickel, 0.3% to 2% copper, and 2 to 10 g/t PGM) reaching levels of 7.5 Mt, 5.5 Mt, and 5.5 Mt, respectively. In 2006, the composition of ore extracted on the Taymyr Peninsula changed with a 180,000-t reduction in the production of nickel-rich ore owing to the decommissioning of facilities and a 220,000-t decrease in output of cuprous ores owing to the renovation of facilities. Output of disseminated ore increased by 139,000 t (MMC Norilsk Nickel, 2007).

The key projects that would enable Norilsk Nickel to achieve its production target of 7.5 Mt/yr of nickel-rich ore on the Taymyr Peninsula were the development of the Skalisty Mine, which would have a total capacity of 3 Mt/yr, and mining of the lower horizons of the Taymyrsky Mine, which would increase total output at Taymyrsky to 4 Mt/yr by 2011 (MMC Norilsk Nickel, 2007).

The increase in cuprous ore output on the Taymyr Peninsula to 5.5 Mt would be achieved by increased mining of curprous

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ores at the Oktyabrsky Mine to 3 Mt/yr, which would offset the depletion of nickel-rich ore. An expansion of cuprous ore mining by 2.5 Mt/yr was planned at the Komsomolsky Mine, with a total projected output at Komsomolsky of 4.3 Mt/yr. Achieving an optimal production of disseminated ore of 5.5 Mt/yr would be achieved by stripping new mining areas at the Komsomolsky, the Oktyabrsky, and the Zapolyarny Mines (MMC Norilsk Nickel, 2007).

In 2006, Norilsk Nickel's ore production on the Kola Peninsula totaled 7.634 Mt, which was an increase of 12.2%. Production on the Kola Peninsula was projected to remain at about 7.5 Mt/yr, which would be achieved by commissioning the Severny-Gluboky Mine at its design capacity of 6 Mt/yr by 2012; production from Severny-Gluboky would offset the decommissioning of the Tsentralnaya open pit (MMC Norilsk Nickel, 2007).

The implementation of Norilsk Nickel's mine development plan would enable Norilsk Nickel to maintain stable metal production levels. Increases in base and precious metals production on the Taymyr Peninsula would be achieved by using newly developed technology to upgrade concentration operations and expand their capacity and also by increasing the rate of processing of stored pyrrhotite tailings. On the Kola Peninsula, the modernization of metallurgical operations was primarily aimed at reducing sulfur dioxide emissions (MMC Norilsk Nickel, 2007).

The Yuzhuralnikel enterprise, which was a producer of nickel from laterite ore in the Ural Mountains, increased nickel production by 14% to 14,400 t (Interfax Russia & CIS Metals & Mining Weekly, 2007t). The Ufaley Nickel plant in the Ural Mountains, which produced cobalt metal and oxides, granulated nickel, and nickel monoxide, had plans to increase nickel production by between 18% and 27% to between 13,000 and 14,000 t/yr and to increase cobalt production by 21.7% to 2,800 t/yr (Interfax Russia & CIS Metals & Mining Weekly, 2007p).

Niobium (Columbium).—Russia's niobium consumption in 2006 was estimated to be between 25 and 30 t, but was projected possibly to increase to 500 t by 2010. The country's niobium reserves are located in 22 known deposits. The only enterprise that mined niobium was the Karnasurt mining enterprise, which was subordinate to AO Sevredmet, which mined the Lovozerskoye loparite deposit on the Kola Peninsula. The concentrate was processed at the Silimae rare-earth-metals processing plant in Estonia. A Russian development program envisioned processing 12,000 t/yr of loparite ore from Lovozerskoye at the OAO Chepetskiy machinery manufacturing plant, which would produce 3,900 t/yr of titanium dioxide, 873 t/yr of niobium pentoxide, 472 t/yr of neodymium oxide, 310 t/yr of zirconium dioxide, 280 t/yr of lanthanum oxide, 61 t/yr of tantalum pentoxide, and 56 t/yr of praseodymium oxide (Kurkov and Kotova, 2007). The Katuginskyoe deposit in Chita Oblast was projected to be a significant supplier of niobium after 2010. The largest and most significant prospective source of niobium was the Tomtorskoye deposit on the Taymyr Peninsula in East Siberia, which had an average contained niobium oxide content of 6.71%. The first stage of a planned mining enterprise to develop this deposit was projected to produce 10,000 t/yr of ore; reserves were adequate to maintain production for about 100 years (Kurkov and Kotova, 2007).

Platinum-Group Metals.—In 2006, output at Norilsk Nickel, which produced more than 95% of the country's platinum-group metals (PGM), totaled 3,164,000 troy ounces (97.4 t) of palladium and 752,000 troy ounces (23.4 t) of platinum, which was a slight (0.9%) increase compared with output in 2005. The increase was partly the result of the increased content (1.7%) of PGM in the ore (MMC Norilsk Nickel, 2007).

Plans for 2007 called for Norilsk Nickel to produce between 98 and 99 t of palladium and between 23 and 24 t of platinum. A comparatively small amount of PGM consisting primarily of platinum was being mined from placer deposits (Interfax Russia & CIS Metals & Mining Weekly, 2007f). Based on the results of an independent audit conducted in accordance with the standards of the JORC, proven and probable reserves of palladium on the Taymir Peninsula exceeded 63 million troy ounces (about 2,000 t) and more than 16 million troy ounces of platinum (about 500 t) at a combined grade of 7.54 g/t PGM (MMC Norilsk Nickel, 2007).

Barrick Gold Corp. ABX of Canada estimated that its Fedorova Tundra deposit in the Murmansk region contains measured and indicated resources of 1.1 million troy ounces (about 34 t) of palladium and 300,000 troy ounces (about 9 t) of platinum and inferred resources (as of the end of 2006) of 1.3 million troy ounces of palladium (about 40 t) and 300,000 troy ounces (about 9 t) of platinum. Barrick planned to mine the deposit to produce concentrate, which would be processed at Norilsk Nickel's Severonikel plant on the Kola Peninsula. Production was scheduled to commence in 2010, with output projected to be 150,000 t/yr of concentrate expected to contain 98 g/t of PGM. Barrick had a 50% stake in the project; the other 50% belonged to Cascadia International Resources, Inc. of Canada, which received the right to mine this project from BHP Billiton in 2001 (Interfax Russia & CIS Metals & Mining Weekly, 2007a).

Rhenium.—Future Russian consumption of rhenium was projected to be between 2 and 5 t/yr. Rhenium reserves are hosted in three molybdenum deposits—the Agaskyrskoye and the Sorskoye deposits in Khakasiya and the Malo-Oynogorskoye deposit in Buryatiya (Kurkov and Kotova, 2007).

Scandium.—In 2006, Russia was not producing scandium. Russia's annual demand for scandium after 2010 was estimated to be in the range of from 1.6 to 2 t. Scandium reserves are located in four deposits, one of which is a bauxite deposit in Sverdlovsk Oblast' and three of which are tin deposits in Chita Oblast' and Khabarovsk Kray. The country has many other potential sources of scandium, which include production as a byproduct of uranium ore and recovery from wastes produced during the magnetic separation of iron-vanadium ores (Kurkov, and Kotova, 2007).

Tantalum.—Russian tantalum consumption in 2006 was about 10 t/yr, but could be 100 t/yr by 2010. Reserves of tantalum are in 21 deposits and almost all also contain niobium. In 2006, tantalum was being mined from the Lovozerskoye deposit on the Kola Peninsula. Tantalum mining at the Etykinskoye deposit of the Zabaykalskiy mining and beneficiation complex had practically ceased. It will likely not

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be possible to satisfy future Russian tantalum demand by mining these two deposits. The Lovozerskoye and the Zabaykalskiy mining enterprises were either on the verge of being unprofitable or were unprofitable. Russia did not have any enterprises that produced metallic tantalum and depended on tantalum metal that had been produced at the Ulba plant in Kazakhstan. The most prospective deposit for tantalum development was considered to be the Katuginskoye deposit in the Chita Oblast' (Kurkov and Kotova, 2007).

Titanium.—Russia's VSMPO-Avisma, which was the world's leading producer of milled titanium products, produced titanium sponge and rolled titanium metal; in 2006, it increased production of titanium metal by 15% to 23,900 t owing to increased global demand for titanium and its products. The company planned to increase production of titanium metal to 27,200 t in 2007, and then to 31,400 t in 2008, at which time plans called for exporting 25,000 t and for the remaining 6,400 t to be sold to consumers in Russia and other CIS countries. Longer-range plans called for VSMPO-Avisma to produce 32,800 t in 2009, 35,600 t in 2010, and more than 35,800 t in 2011. Demand for titanium metal in Russia was forecast to increase to 10,000 t in 2012 from 5,400 t in 2006 owing in part to increased demand from the expanding Russian aircraft industry. The Russian aircraft industry was projected to consume 6,500 t by 2012 compared with 3,500 t in 2006. The state-owned weapons exporter Rosoboronexport owned 66% of VSMPO-Avisma (Interfax Russia & CIS Metals & Mining Weekly, 2007u, v).

Industrial Minerals

Barite.—In 2006, Russia's barite production was estimated to be 63,000 t, but Russia's barite consumption was assessed to be between 350,000 and 400,000 t and was projected to increase to between 800,000 and 900,000 t by 2010. The country's main barite producer was the Salarinskiy lead-zinc mining and beneficiation complex, which mined the Kvartsitovaya Sopka deposit and was supplying 10% of the country's barite consumption. Barite from Salarinskiy was produced as a byproduct of lead-zinc ore mining because barite made up less than 15% of the content of the ore. Russia's barite resources were estimated to total 165.3 Mt, of which 30 Mt was assessed to be economic reserves (Gerasimov, 2007).

Diamond.—In 2006, Russia increased diamond mine production to 38,360,810 carats, or by less than 1%. Russia mined 38 million carats of diamond in 2005. Mine production of raw diamond increased in value to $2.575 billion in 2006 from $2.531 billion in 2005. Russia exported 35 million carats of uncut diamond valued at $1.7 billion in 2006, which included exports of diamond from the State Precious Metals and Gemstones Repository (Gokhran). Russia exported 23 million carats of uncut diamond worth $1.658 billion in 2005. Among the leading importers of Russian uncut diamond in 2006 were the EU, Israel, and the United Arab Emirates (Interfax Russia & CIS Metals & Mining Weekly, 2007j).

Gemstones.—The Kaliningrad Amber enterprise, which was located in the Kaliningrad region where 95% of the world's amber reserves are located, was the only commercial amber producer in the region. In 2003, the Amber enterprise declared bankruptcy but completely paid off its debts in May 2007. Almost all net profits earned in 2006 went to paying off its debts. In the fall, it was agreed that ALROSA, the country's monopoly diamond producer, and the Kalinigrad regional authorities would become joint owners of Kalinigrad Amber, which consists of a mining enterprise and a jewelry firm. Investment in Kaliningrad Amber would enable it to raise production to between 200 and 250 t/yr (Interfax Russia & CIS Metals & Mining Weekly, 2007b).

Lithium.—In the mid-1980s, the Soviet Union, which was producing about 10 t/yr of lithium calculated in carbonate equivalent, was the world's second ranked lithium producer following the United States. It was mining low-grade ore from the Zavitinskoe deposit, which had an average lithium oxide content of 0.6%. After the dissolution of the Soviet Union, this deposit was not profitable for Russia to mine under market economy conditions and production was mothballed.

Russia occupies a leading position in the world in lithium reserves, which are located primarily in two regions. One region is the Kola Peninsula, which has about 7 Mt of lithium oxide, and the other is in Sayanakh, which has 1 Mt of lithium oxide. Programs had been drawn up to restart production at the Zavitinskoye deposit and at the Achikanskiy sector near the Etykinskoye deposit, which contain a lithium oxide content of between 0.7% and 0.8% lithium oxide. Decisions about the future development of lithium reserves would depend on changes in the use of lithium in the 21st century and technological developments for processing lithium (Kurkov and Kotova, 2007).

Phosphate Rock.—In Russia, the major source of phosphate raw material ore is the apatite reserves in the Khibiny massif and Kovdor deposit on the Kola Peninsula. The Khibiny apatite-nepheline ores contain about 90% of the country's apatite reserves and have a P_2O_5 content of between 12% and 16%; the Kovdor ores contain about 6% of the country's reserves and have a P_2O_5 content of between 6% and 7% (Brylyakov and others, 2007).

The OAO Apatit complex (a part of FosAGro Holding), which mines the Khibiny massif, produced about 8.5 Mt/yr of apatite and nepheline concentrates and employed about 12,500 people. Beneficiation of apatite-nepheline ore from the Khibiny massif occurred at two beneficiation plants, which produced two types of apatite concentrate—"standard," which contains not less than 39% P_2O_5, and "super," which contains 40% P_2O_5 and less than 0.02% titanium dioxide. OAO Apatit consisted of four mining enterprises—the Kirovsky, the Rasvumshorrsky, the Tsentralny, and the Votochny. About 54% of ore from the Khibiny massif was mined from open pits, and the remaining 46% was mined from underground mines; in the future, extraction would be solely from underground mines because of depleting reserves. Reserves at Khibiny are sufficient to sustain production through 2050. The Kovdor mining and beneficiation complex had an open pit with the capacity to mine 10 to 12 Mt/yr of ore to produce 1.9 Mt of apatite concentrate (Brylyakov and others, 2007; Grigoryiev, 2007).

Another source of phosphate raw material is the more than 30 sedimentary phosphate rock deposits in the European part of Russia; this raw material can be processed into phosphate flour.

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These deposits are only economic to mine if all byproducts are fully used, including dolomite, glauconite, and quartz (Brylyakov and others, 2007).

Sedimentary phosphate rock from deposits in the Bryanskaya Oblast' (Polpinskoye deposit), Kirov Oblast' (Vyatsko-Kamskoye deposit), and Moscow Oblast' (Yegor'yevskoye deposit) can be processed into phosphate flour. Although Russia once had the capacity to produce 4.7 Mt/yr of phosphate flour containing 1 Mt of P_2O_5 from these sedimentary phosphate rock deposits, since 2000, production has practically ceased; in 2006, production was about 12,800 t of P_2O_5. The country's demand for phosphate flour from these sedimentary phosphate rock deposits is in the range of from 1.1 to 2.6 Mt/yr of P_2O_5 (Brylyakov and others, 2007).

Sedimentary phosphate rock containing about 6% P_2O_5 from the Baltic Basin was mined primarily by the OAO Fosforit enterprise from the Kingisepp deposit, which produces a phosphate flour with a 28% P_2O_5 content. Fosforit was constructed with a capacity to mine 7 Mt/yr of ore, but owing to the lack of demand in the world market for phosphate flour, it had mothballed about one-half of its production capacity. The remaining phosphate flour was produced for use domestically to produce complex fertilizers. Since 2005, Fosforit had been processing about 2.5 Mt/yr of ore containing 6.8% P_2O_5 and producing 380,000 t/yr of phosphate flour (Brylyakov and others, 2007).

Rare Earths.—Russia consumed about 100 t of rare earths in 2006. Reserves of rare earths were located in 14 deposits, but rare earths were being mined only at the Lovozerskoye deposit on the Kola Peninsula. Rare-earth elements make up 32% of the loparite ore (Kurkov and Kotova, 2007). The richest source of rare-earth ores in Russia is the Tomtorskoye deposit on the Taymyr Peninsula. The rare earths of the cerium and samarium subgroups make up 11.96% of the ore, and those of the yttrium subgroup make up 0.84%. The yttrium oxide content of the ore is between 0.5% and 0.8%. An economic assessment of this deposit determined that it would be economic even at the small production level of 100,000 t/yr of ore (Kurkov and Kotova, 2007).

Salt.—Russia reportedly has abundant salt reserves, which were estimated to total about 49 Gt. The country produces only about 2.9 Mt/yr of salt, however, which is less than is produced in other large countries, such as Canada, China, India, and the United States. Russia imported more than 17% of its salt consumption. In 2005, the Artemsol' enterprise in Ukraine exported 870,000 t of table salt to Russia; another major supplier of salt to Russia was the Mozyrsol' enterprise in Belarus. The main obstacle to Russia developing its salt resources for domestic consumption is the cost of shipping salt over long distances. Owing to the small profit margin in salt, it must be marketed fairly close to the region in which it is mined. Table salt production occurred at seven enterprises, each of which had a relatively concentrated market. The leading Russian producer of table salt was AO Bassol', which supplied 70% of the country's needs. Another significant producer was OAO Silvinit, which developed the reserves of the Verkhnekamsk deposit of potash-magnesium salts to produce a combined 1.08 Mt of table and technical salt in 2006. OAO Silvinit produced one-third of the country's technical salt.

Zirconium and Hafnium.—Russia reportedly ranked fourth in the world in zirconium reserves with about 8.5% of world reserves. Russia's reserves of zirconium that were termed economic reserves (balansovye zapasy) under the reserve classification system that had been used in the Soviet Union and then in Russia are located in 11 deposits, of which 6 are placer deposits and the remainder are hard rock deposits. About 70% of the country's zirconium reserves are located in Siberia. Up until 2010, placer deposits could be mined to provide zirconium; development of the hard rock deposits would follow (Kurkov and Kotova, 2007).

The country's only domestic source of zirconium production was the 3,000 to 5,000 t/yr of baddeleyite concentrate produced as a byproduct from apatite-magnetite ores at the Kovdor mining and beneficiation complex on the Kola Peninsula. The concentrate had a low zirconium content and the extraction rate of the metal was also quite low, amounting to about 17%. The concentrate was exported mainly to Japan and Norway (Shevelyev and Tokhtas'yev, 2006; Kurkov and Kotova, 2007).

The country's atomic energy industry's demand for zirconium was 100 t in 2002, but this demand was projected to increase to 1,400 t in 2010. The most prospective hard rock deposit was deemed to be the Katuginskoye complex rare-earth–chryolite–zirconium–niobium–tantalum deposit in the north of Chita Oblast' in the Baikal-Amur Mainline (BAM) railroad region. This deposit was considered adequate to fully supply the atomic energy industry's needs for zirconium, as well as for niobium and tantalum, and to supply partially its demand for yttrium. Mining of this deposit, if it is developed, would not occur until 2010 (Kurkov and Kotova, 2007).

Mineral Fuels and Related Materials

The country's energy sector, which was a main determinant of the country's economy, was on the verge of a significant structural change owing in part to projected changes in the country's energy balance caused by the changing relative prices of fuels. In 2005, natural gas generated 44% of the country's electric energy; coal and hydroelectric power, 20% each; nuclear power, 15%; and oil, 3%. The Government had placed an emphasis on the future development of domestic electric energy generation capacity through the development of coal, hydroelectric, and nuclear sources for generating electric power to meet the large and increasing domestic demand. In the process, the role of natural gas, which was the main source of fuel for electric energy generation, would be diminished and role of coal woul be increased (Linyev and others, 2007; Shchadov, 2007).

Coal.—Out of a total of 309 Mt of coal mined in 2006, about one-third was mined underground (Taraznov, 2007). As of January 2006, Russia had in operation 97 underground coal mines and 139 open pits and a total design capacity to mine about 325 Mt/yr of coal. The country's coal reserves were assessed to be about 200 Gt. Reserves were adequate to ensure coal output for centuries, even at double to triple the country's current output. The Kuznetsk Basin (Kuzbas) was the country's main producing region and would be in the future. Reserves in the Kuzbas contained all grades of hard coal and were suitable for use in energy generation and coke production. The Kuzbas

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accounted for more than 56% of Russia's coal output and provided 80% of the metallurgical coal consumed domestically (Shchadov, 2007).

Revised projections in a moderate case scenario called for Russian coal production to increase to 410 Mt by 2015 and 470 Mt by 2020. Earlier projections in the moderate scenario called for coal production to increase to 375 Mt by 2020 (Shchadov, 2007). In 2006, 14 coal mining enterprises were in the stage of design and construction with a total capacity of 14 Mt/yr; 4 beneficiation plants were also in this stage with a capacity of 4 Mt/yr. Growth in coal production would come from the eastern part of the country from the large Kansk Achinsk brown coal basin; the Pechora Basin, which has significant reserves of metallurgical coal; and from the South Yakutiya basin. Coal production in the current large producing areas in the European part of Russia and the Ural Mountains was projected to stabilize but, under favorable circumstances, could increase by 30 Mt/yr (Shchadov, 2007).

Improving coal quality through washing and employing technologies to lower the moisture content and the nonhydrocarbon mineral content of coal would be an important factor in increasing the role of coal in the country's energy balance and in protecting the environment. Russia's electric power stations consumed coal, it was claimed, with a lower calorific value than any other country of the world. The ash content of coal consumed at Russia's power stations was as high as 20%, which did not include coal obtained from the Ekibaztus coal basin in Kazakhstan where the ash content exceeded 40%. The average moisture content of coal used at Russian electric powerplants was 23%. Coal that Russia exported, however, had an average ash content of 11% and a moisture content of 8%. In the ecological sphere, the Government was calling for implementing measures to capture and use emissions from coal beneficiation as well as coal-bed methane (Shchadov, 2007).

The number of fatalities from accidents in Russian coal mines has ranged from as high as 288 per year to as low as 85 per year in the past 10 years. The number of fatalities in 2006 was 85 (Taraznov, 2007).

Natural Gas.—Russia was the world's leading natural gas producer and exporter and has the world's largest natural gas reserves, with 1,680 trillion cubic feet (almost 47.6 trillion cubic meters) of reserves, which is almost twice the size of the reserves in Iran, which has the next largest gas reserves (U.S. Energy Information Administration, 2007b). In 2006, natural gas production increased by about 3% compared with that of 2005 to more than 656 billion cubic meters. Almost 90% of the country's natural gas was produced in the Ndym-Pur-Taz (NPT) region in northern West Siberia. (The name of the region was derived from the names of three rivers that border the region.) The NPT region hosts three massive Russian gasfields (Medvezhye, Urengoy, and Yamburg), which had been the country's main producers, supplying about 70% of the country's gas production. These three fields were in decline, however, as reserves were being depleted. Owing to the growth in the Russian economy and the country's long-term export commitments to Europe, to increase gas output Russia would have to incur greater costs to develop fields further north and to the east in an even more difficult physical environment than in the NPT region. A main target for future development is likely to be the Yamal Peninsula, where large reserves were discovered in several fields (Sagers, 2007).

OAO Gazprom, which was a joint stock company in which the Government was the largest stakeholder (a 50.002% controlling share), produced 83.9% of the country's gas output in 2006 and controlled and operated the country's natural gas trunk pipeline network. Gazprom was Russia's leading foreign currency earner and paid about 25% of the country's total Federal tax revenues. Although Gazprom projected that it would increase natural gas output between 2008 and 2030, most increases in natural gas output were projected to come from independent gas companies, such as Itera, Northgaz, and Novatek, which, although blocked from the export market, had found a niche supplying the domestic market (Sagers, 2007; U.S. Energy Information Administration, 2007b).

Gazprom owned the world's largest gas transmission system, the Unified Gas Supply System of Russia, which extended for 156,900 km and through which it exported gas to 32 countries. In 2006, Gazprom sold 101 billion cubic meters of gas to the CIS and the Baltic States and 161.5 billion cubic meters to other European countries. In 2005, construction began on the Nord Stream pipeline; this pipeline could substantially enhance the flexibility of Gazprom's supply routes to Europe. Gazprom was preparing to develop the Barents Sea Shtokman offshore field, which was to serve as the resource base for Russian gas exports to Europe by way of the Nord Stream pipeline. In 2006, Gazprom and ENI S.p.A. of Italy signed a memorandum of understanding regarding construction of the South Stream gas pipeline, which would be laid on the bottom of the Black Sea from the Russia's coast to the coast of Bulgaria. Priorities for Gazprom were the development of gasfields on the Arctic continental shelf, in East Siberia, in the Russian Far East, and on the Yamal Peninsula (Gazprom, 2008).

Petroleum.—In 2006, Russia's production of crude oil increased by 2.3% to 480.48 Mt and made Russia the world's leading oil producer, overtaking Saudi Arabia. Russia remained the world's second ranked petroleum exporting nation. Since 2004, however, the rate of growth in Russian oil production had leveled off to somewhat above 2% annually, which had called into question the long-term growth potential for Russia's oil. Slow growth had been attributed to lack of adequate investment, although questions had also been raised regarding the country's reserve potential. According to data in the BP Statistical Review of Energy 2006, Russia's proven reserves of oil and gas condensate at the end of 2005 totaled 10.2 Gt, which yielded a reserves-to-production ratio of 21.4 years. Reserves in fields that were in operation could be depleted within a decade, however. In 2006, additions to reserves exceeded production. Some Russia officials believed that Russia has a large resource base that could serve to replenish oil reserves if adequate investment is devoted to exploration (Kryukov and Moe, 2007).

Most of Russia's reserves are located in West Siberia between the Ural Mountains and the Central Siberian Plateau. Little exploration had occurred in East Siberia where only four or five oilfields and gasfields had been discovered despite the promise of large resources. For the coming decade, Russian oil production was projected to grow at an annual rate of about 1.5% to 2.5% annually, owing in part to increased output from

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oil development on Sakhalin Island coupled with a slowdown in growth from the major mature oilfields in West Siberia, a number of which had passed peak production. New fields that that were under development would likely produce almost all Russia's increase in annual oil output in the next 5 years and could probably produce more than one-half of the country's oil by 2020. These new fields will help stem production losses at older fields. The new fields include Lukoil/ConocoPhillips's TimanPechora project, Rosneft/Gazprom's offshore Prirazlomnoye project, Rosneft's Vankorskoye and Komsomolskoye development, projects on Sakhalin Island, and the Shell Joint Venture's West Salymskoye project (U.S. Energy Information Administration, 2007c).

Uranium.—Russian uranium production was controlled by the Corporation TVEL TVEL supplied the entire fuel requirement to 73 nuclear powerplants in Russia and in 13 countries, which included Armenia, Bulgarian, China, the Czech Republic, Finland, Hungary, Lithuania, Slovakia, and Ukraine, to 30 research reactors in Russia and abroad, and to ship-propulsion reactors of the Russian fleet. TVEL held 17% of the world's nuclear fuel market. It included enterprises that mine and process uranium, including the Priargunsky Industrial Mining and Chemicals Association, the OAO Khiagda, and the ZAO Dalur uranium mining enterprises. The Priargunsky Industrial Mining and Chemical Association (Krasnokamensk, Chita Region) was among the five leading uranium mining enterprises in the world. TVEL also included enterprises that produced component parts and fuel assemblies. These enterprises included Chepetsky Mechanical Plant (Glazov, Udmurtia), Mashinostroitelny Zavod (Electrostal, Moscow Region), and Novosibirsk Chemical Concentrates Plant (Novosibirsk). TVEL employed a total of about 40,000 people (Corporation TVEL, 2007).

In 2006, under an initiative launched by the Russian President, a course was set for increasing nuclear power generation's share to 25% of the country's energy generation by 2030, which would involve building of up to 40 new nuclear reactors in Russia. During 2006, TVEL paid special attention to the development of mining enterprises. The main processing complex at the Dalur mining and ore beneficiation plant was commissioned, which significantly increased ore processing capacity (Corporation TVEL, 2007).

The Priargunsky Industrial Mining and Chemicals Association could increase uranium production in the Chita region to 5,000 t/yr by 2015, or by more than 50%. Plans called for Priargunsky to develop the sixth and eighth mines. The sixth mine would be the main source of uranium and was scheduled to be producing 1,000 t/yr by 2015, and the eighth mine, 800 t/yr. With production from these two mines, Priargunsky could produce 5,000 t/yr. It would require considerable investment to commission these new mines and also to implement associated measures to protect the environment (Interfax Russia & CIS Metals & Mining Weekly, 2007g).

Russia was establishing the Uranium Mining Company (UMC), which was registered on November 20, to consolidate its uranium mining assets in Russia and abroad. UMC would mine uranium not just in Russia but also abroad, possibly in Australia and Canada. Plans called for UMC to be fully formed during the first half of 2008. It would require transferring the mining assets of TVEL to UMC, which would first become the trustee of these assets. The company would be fully established once Atomenergoprom, a holding company for civilian atomic energy enterprises, was formed. Russia's Prime Minister signed a resolution establishing Atomenergoprom, but the Government would have to issue another resolution approving the new holding's charter before it could be fully established. Atomenergoprom was scheduled to be formed by July 1, 2007 (Corporation TVEL, 2007).

Reserves and Resources

More than 20,000 mineral deposits had been discovered in Russia, of which about 40% was in commercial production. From 1992 to 2003, there was a sharp reduction in the amount of geologic exploration, but this trend was reversed beginning in 2004. Russia reportedly has adequate mineral reserves to meet the country's current metal consumption needs except for chromite, lead, manganese, molybdenum, and tungsten, although the time period for which these reserves would be adequate was not specified. However, the average ore grade of many of the metallic ores, which include bauxite, copper porphyries, tin, tungsten, and others, is lower than in other producing countries. In the past 20 years, the average metal content of ores has decreased by between 30% and 50%, and the gold and iron content in ores, by 25%. The percentage of ores and coal classified as difficult to beneficiate has increased to 40% from 15%. A large percentage of the reserves that were classified as economic (balansovye) according to the reserve classification system used in the Soviet Union and then in Russia would be reclassified as subeconomic resources if they were evaluated based on market economy criteria. Reportedly, 34% of lead, 49% of tin, and from 15% to 30% of apatite, coal, copper, and titanium reserves would have to be reclassified as subeconomic resources (Chanturiya, 2007).

To secure its raw material resource base for oil and gas, the Ministry of Natural Resources was conducting exploration in 2006 that resulted in the discovery of 37 new oil and gas deposits, with 395,000 square kilometers (km^2) prepared for licensing. For the second year in a row, Russia's discovery of oil and gas reserves exceeded its annual extraction. Basic gas and oil exploration expenditures in 2008 were to be directed at regions of East Siberia, the Sakha (Yakutiya) Republic, and Russia's continental Arctic shelf. Expeditions conducted in 2005 and 2007 in the Arctic led the Russian Ministry of Natural Resources to conclude that the Lomonosov range of the shelf should be included in Russia's economic zone. Russia was preparing documentation to submit its claim to the appropriate international organizations. Among the most notable discoveries was the Central Astrakhan gas condensate deposit, which was estimated to have about 1.26 billion cubic meters of gas; the Angoaro-Lenskoye deposit in Irkutsk Oblast, with reserves of 1.1 billion cubic meters of gas; and the Severo-Komar'inskoye and Kosukhinkoye oil deposits in the south of Tyumen' Oblast', with reserves of 19.7 Mt and 18 Mt, respectively (Ekonomika i Zhizn', 2007).

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Norilsk Nickel, which was the world's leading producer of nickel and palladium and a major global producer of copper and platinum, signed an exploration agreement with Rio Tinto Group in 2006 for the exploration and subsequent development of deposits in the Far East and the Siberian regions of the country and with BHP Billiton for exploration in West Siberia and the northwestern regions of the country (MMC Norilsk Nickel, 2007).

Outlook

The mainstay of Russia's mineral sector and economy for the coming decade is expected to be the oil and gas sector, where production is projected to increase, although at a lower rate of growth than in the preceding decade because of depleting reserves and a lack of adequate investment. Nevertheless, a continuation of high energy prices would enable Russia to continue its high rate of economic growth based on revenues from oil and gas exports. In Russia's nonfuel mineral production sectors, Russia's Economic and Trade Ministry projects that the output of nonferrous metals could increase by as much as 13% by 2010. This is predicated on significant growth in the aluminum industry through projects underway to upgrade existing production capacity and the construction of a new aluminum smelter. New copper mines are being developed in the Ural Mountains, which will provide for an increase in copper production of between 2% and 3% per year; the construction of a zinc plant in the Ural Mountains will increase zinc output. Increases are also projected for nickel production (Interfax Russia & CIS Metals & Mining Weekly, 2007m).

In the Russian metallurgical industry, only about one-half of the technological processes used in production are on the level of those used in industrially developed countries. This has had the negative effect of requiring above-average expenditures compared with those of industrially developed countries to produce goods, thereby affecting the competitiveness of the products produced. For the Russian metallurgical sector to remain competitive on the world market, it would need to develop resource-saving technologies, organize new types of production, and develop more high-value-added products (Parkhomenko, 2007).

References Cited

Avdokhin, V.M., and Gubin, S.L., 2007, Sovremennoye sostoyaniye i osnovniye napravleniya razvitiya protsessov glubokogo obogashcheniya zheleznykh rud [The current state and basic directions in the development of processes for the deep beneficiation of iron ores]: Gornyy Zhurnal [Mining Journal], no. 2, p. 58-64.

Brayko, V.N., and Ivanov, V.N., 2007, Itogi raboty zolotodobyvayushchey promyshlennosti Rossii v 2006 g. I ee perspektivy na blizhayshiye godi [Results of the work of Russia's gold mining industry in 2006 and its perspective development in the approaching years]: Mineral'nye resursy Rossii, Ekonomia I Upravleniye [Mineral Resources of Russia, Economics and Management], no. 2, p. 29-42.

Broneyoy, V.A., Malytsev, K.R., Karapetyan, A.V., and Iyevlev, A.A., 2007, Sozdaniye sovremennogo boksito-glinozemnogo kompleksa v Respublike Komi [Development of a modern bauxite-alumina complex in the Komi Republic], Gornyy Zhurnal [Mining Journal], no. 3, p. 28-30.

Brylyakov, Y.E., Gershenkop, A.Sh., and Lygach, V.N. 2007, Sovremennoye sostoyanie I osnovnye napravleniya razvitiya tekhnologii glubokoy I kompleksnoye pererabotki fosforsoderzhashchikh rud [Current state and basic directions for the development of technology for the deep and complex processing of phosphorus containing ores]: Gornyy Zhurnal [Mining Journal], no. 2, p. 30-38.

Chanturiya, V.A., 2007, Perspektivy ustoycivogo razvitiya gornopererabatyvayushchiy industrii Rossii [Perspectives for the sustainable development of Russia's mining and processing industry]: Gornyy Zhurnal [Mining Journal], no. 2, p. 2-9.

Corporation TVEL, 2007, Corporation TVEL made a part of Atomenergoprom: Corporation TVEL, October 19. (Accessed November 24, 2007, at http://www.tvel.ru/en/press/news/index.php?from4=1&id4=423.)

Ekonomika oi Zhizn' [The Economy and Life], 2007, V Vostochnuyu Sibir' i Ledovityy Okean [In East Siberia and the Arctic Ocean]: Ekonomika oi Zhizn', October 1, p. 3.

Gazprom, 2008, OAO Gazprom—Global energy company: Gazprom. (Accessed March 3, 2008, at http://www.gazprom.com/eng/articles/article8511.shtml.)

Gerasimov, N.N., 2007, Dobycha I pererabotka baritogo syr'ya [Mining and processing of barite ore]: Gornyy Zhurnal [Mining Journal], no. 3, p. 75-79.

Grigoryiev, A.V., 2007, Mineral reserves of JSC "Apatit" and its outlooks for the future: Russian Mining, no. 1, p. 6-8.

Interfax Russia & CIS Metals & Mining Report, 2007a, Russia exports 17.8 bln in ferrous metals in 2006: Interfax Russia & CIS Metals & Mining Report, issue 6, February 9-15, p. 40.

Interfax Russia & CIS Metals & Mining Report, 2007b, Russia's gold production down 2.25 in 2006: Interfax Russia & CIS Metals & Mining Report, issue 5, p. 44.

Interfax Russia & CIS Metals & Mining Weekly, 2007a, Barrick says Murmansk deposit has 1.1 mln oz palladium resources: Interfax Russia & CIS Metals & Mining Weekly, issue 9, February 23-March 1, p. 21.

Interfax Russia & CIS Metals & Mining Weekly, 2007b, Kaliningrad Amber pays off debt: Interfax Russia & CIS Metals & Mining Weekly, issue 22, May 25-31, p. 13.

Interfax Russia & CIS Metals & Mining Weekly, 2007c, Magnezit to invest 100 mln rubles in Satkinskaya deposits in 2007: Interfax Russia & CIS Metals & Mining Weekly, issue 4, January 19-25, p. 27.

Interfax Russia & CIS Metals & Mining Weekly, 2007d, Metals Holding UMMC thinking about IPO: Interfax Russia & CIS Metals & Mining Weekly, issue 8, February 16-22, p. 29–30.

Interfax Russia & CIS Metals & Mining Weekly, 2007e, Mining at Zarechenskoye to start in June: Interfax Russia & CIS Metals & Mining Weekly, issue 18, April 27-May 3, p. 20.

Interfax Russia & CIS Metals & Mining Weekly, 2007f, Norilsk Nickel meets 2006 production targets: Interfax Russia & CIS Metals & Mining Weekly, issue 5, January 26-February 1, p. 28.

Interfax Russia & CIS Metals & Mining Weekly, 2007g, Priargun to boost uranium production more than 60% by 2014-2015: Interfax Russia & CIS Metals & Mining Weekly, issue 22, May 25-31, p. 18.

Interfax Russia & CIS Metals & Mining Weekly, 2007h, RUSAL to spend $1.4 bln on environmental programs in 2007-2013: Interfax Russia & CIS Metals & Mining Weekly, issue 21, May 18-24, p. 20.

Interfax Russia & CIS Metals & Mining Weekly, 2007i, Russia could raise steel pipe output 6.6% in 2007, Interfax Russia & CIS Metals & Mining Weekly, issue 5, February 2-8.

Interfax Russia & CIS Metals & Mining Weekly, 2007j, Russia edges up diamond production in 2006, Interfax Russia & CIS Metals & Mining Weekly, issue 8, p. 34.

Interfax Russia & CIS Metals & Mining Weekly, 2007k, Russia edges up steel output 6.8% in 2006: Interfax Russia & CIS Metals & Mining Weekly, issue 5, January 26-February 1, p. 45–46.

Interfax Russia & CIS Metals & Mining Weekly, 2007l, Russian Copper Co. boosts sales output in 2006: Interfax Russia & CIS Metals & Mining Weekly, issue 13, March 23-29, p. 16–17.

Interfax Russia & CIS Metals & Mining Weekly, 2007m, Russian nonferrous output to grow 13% in 2007-2010: Interfax Russia & CIS Metals & Mining Weekly, issue 16, April 13-19, p. 32.

Interfax Russia & CIS Metals & Mining Weekly, 2007n, Russia's most strategic fields to be announced as strategic: Interfax Russia & CIS Metals & Mining Weekly, issue 5, January 26-February 1, p. 8–9.

Interfax Russia & CIS Metals & Mining Weekly, 2007o, Udokan reevaluation to be completed at end of 2009: Interfax Russia & CIS Metals & Mining Weekly, issue 17, April 20-26.

Interfax Russia & CIS Metals & Mining Weekly, 2007p, Ufaleynikel to vote on $100 min syndicated loan March 19: Interfax Russia & CIS Metals & Mining Weekly, issue 5, January 26-February 1, p. 43.

Interfax Russia & CIS Metals & Mining Weekly, 2007q, UMMC produces 354,258 t of copper cathode in 2006: Interfax Russia & CIS Metals & Mining Weekly, issue 5, January 26-February 1, p. 31.

Digitized by Google

Interfax Russia & CIS Metals & Mining Weekly, 2007r, UMMC to boost cathode copper, zinc output: Interfax Russia & CIS Metals & Mining Weekly, issue 13, March 23-29, p. 17–18.
Interfax Russia & CIS Metals & Mining Weekly, 2007s, Uralelektromed to increase investment program 50% in 2007: Interfax Russia & CIS Metals & Mining Weekly, issue 6, February 9-15, p. 17.
Interfax Russia & CIS Metals & Mining Weekly, 2007t, Uzhruralnikel's earnings soar in 2006: Interfax Russia & CIS Metals & Mining Weekly, issue 13, March 3-29, p. 24.
Interfax Russia & CIS Metals & Mining Weekly, 2007u, VSMPo-Avsima boosts 2006 revenue 69% to 28.4 bln rubles: Interfax Russia & CIS Metals & Mining Weekly, issue 8, February 16-22, p. 20.
Interfax Russia & CIS Metals & Mining Weekly, 2007v, VSMPO-Avisma to increase titanium output 13.8% in 2007: Interfax Russia & CIS Metals & Mining Weekly, issue 42, November 12-18, p. 14–15.
Kryukov, Valeriy and Moe, Arild, 2007, Russia's oil industry: Risk aversion in a risk-prone environment, Eurasian Geography and Economics, v. 48, May/June, p. 341-357.
Kurkov, A.V., and Kotova, V.M., 2007, Sovremennoye sostoyaniye I osnovnye napravleniya razvitiya protsessov glubokoy I kompleksnoy pererabotki redkometallicheskogo syr'ya [Current state and basic directions for the development of processes for the deep and complex processing of rare metal ores]: Gornyy Zhurnal [Mining Journal], no. 2, p. 72-77.
Linyev, B.I., Deberdeyev, I.K., and Davydov, M.V., 2007, Sovremennoye sostoyeniye i osnovnye napravleniya razvitiya tekhniki i tekhonologii glubokogo obogshcheniya uglya [The current state and basic directions of the development of the tekhniki and technology for deep processing of coal]: Gornyy Zhural [Mining Journal], no. 2, p. 23-29.
MMC Norilsk Nickel, 2007, Norilsk Nickel annual report 2006: MMC Norilsk Nickel. (Accessed February 24, 2008, at http://www.nornik.ru/en/investor/report/annual/.)
Moscow News, 2007, Russia cool on EU energy deregulation: Moscow News, October 26–November 1, p. 16.
Nekrasov, V.M. 2007, Itogi raboty chernoy I tsvetnoy metallurgii Rossii v 2006 g in nekotoriye aspekty ikh razvitiy v blizhayshchey perspective [Results of the work of Russia's ferrous and nonferrous metallurgical sectors in 2006 and some aspects of their development in a near term perspective]: Chernaya Metallurgiya [Ferrous Metallurgy], no. 5, p. 3-7.
Parkhomenko, Roman, 2007, Tsvetnoye I chenoye otctavanie [The lag in nonferrous and ferrous metallurgy]: Ekonomika i Zhizn' [The Economy and Life], no. 45, November 1, p. 36.
Rossiya v Tsifrakh 2007 [Russia in Figures 2007], 2008a, Trud [Labor]: Federal State Statistics Service. (Accessed February 11, 2008, at http://udbstat.eastview.com/catalog/readbook.jsp?issue=639240.)
Rossiya v Tsifrakh 2007, [Russia in Figures 2007], 2008b, Vneshnyaya Torgovlya [Foreign trade], 2008: Federal State Statistics Service. (Accessed February 11, 2008, at http://udbstat.eastview.com/catalog/readbook.jsp?issue=639240.)
Sagers, M.J., 2007, Developments in Russian gas production since 1998—Russia's evolving gas supply strategy: Eurasian Geography and Economics, no. 6, p. 651-698.
Shchadov, V.M. 2007, Ekologicheskiye problemy ugol'noy otrasli na zavershayushchem etape restrukturizatsii [Ecological problems of the coal sector at the concluding stage of restructuring]: Ugol' [Coal], no. 5, p. 31-36.)
Shevelyev, A.I., and Tokhtas'yev, V.S., 2006, Netraditsionnye vidy mineral'nogo syr'ya dlya proizvodstva ogneuprov [Nontraditional types of mineral raw material for the production of refractories]: Mineral'nye Resursy Rossii, Ekonomika I Upravleniye [Russian Mineral Resources, Economics and Management], no. 5, p. 13-16.
Solozhenkin, P.M., 2007, Tekhnologii oborashcheniya I pererabotki zolotosur'myannykh rud I kontsentratov [The technology of beneficiating and processing gold-antimony ores and concentrates]: Gornyy Zhurnal [Mining Journal], no. 2, p. 88-91.
Taraznov, Igor, 2007, Itogi raboty ugoln'noy promyshlennosti Rossii za Yanvar'-Mart 2007 goda [Results of the work of the Russian coal mining industry for January to March 2007]: Ugol' [Coal], no. 6, p. 37-41.
United Company RUSAL, 2007, Khakas aluminum smelter: United Company RUSAL. (Accessed November 9, 2007, at http://www.rusal.com/index.php?lang=eng&topic=3&subtopic=57&subtopic2=70&subtopic3=217.)
United Company RUSAL, 2008, Investment projects: United Company RUSAL. (Accessed February 24, 2008, at http://www.rusal.com/index.php?lang=eng&topic=1&subtopic=225.)
U.S. Energy Information Administration, 2007a, Russia—Background: U.S. Energy Information Administration country analysis brief, April. (Accessed February 9, 2008, at http://www.eia.doe.gov/cabs/Russia/Background.html.)
U.S. Energy Information Administration, 2007b, Russia—Natural gas: U.S. Energy Information Administration country analysis brief, April. (Accessed March 3, 2008, at http://www.eia.doe.gov/cabs/Russia/NaturalGas.html.)
U.S. Energy Information Administration, 2007c, Russia—Oil: U.S. Energy Information Administration country analysis brief, April. (Accessed March 3, 2008, at http://www.eia.doe.gov/cabs/Russia/Oil.html.)
Yuzov, O.V. Sedykh, A.M., and Afonin, S.Z., 2007, Ekonomicheskiye pokazateli I problemy razvitiya chernoy metallurgii Rossii [Economic indicators and problems of the development of ferrous metallurgy in Russia]: Chernaya Metallurgiya [Ferrous Metallurgy], no. 4, p. 13-19.

TAJIKISTAN

Tajikistan's mineral industry formerly mined mineral ores and produced mineral products, which included aluminum, antimony, arsenic, boron, celestite, cement, coal, construction materials, fluorspar, gold, lead and zinc, mercury, molybdenum, natural gas, petroleum, semiprecious and decorative stones, salt, silver, strontium, tin, tungsten, and uranium. Production of some of these mineral commodities had been greatly reduced or had ceased since the dissolution of the Soviet Union. The Tajik aluminum smelter (TadAZ) was the country's only large-scale production enterprise in the mineral sector.

Tajikistan was the world's third ranked producer of hydroelectric power after the United States and Russia. Hydroelectric power accounted for more than 75% of the country's total energy output. The country's energy consumption per capita was among the lowest in the CIS. Developing hydroelectric energy was considered key for future economic growth because of the country's need to import oil and natural gas from neighboring countries and the high energy consumption of the TadAZ aluminum smelter. Tajikistan imported a significant portion of fuel from Uzbekistan, which supplied more than 70% of Tajikistan's petroleum needs. Other CIS countries, such as Kazakhstan and Turkmenistan, provided much of the remainder of the country's imported hydrocarbons (Embassy of Tajikistan to Pakistan, undated).

More than 400 mineral deposits had been explored that were deemed suitable to be considered for development. Tajikistan possesses significant resources of precious metals. According to the Academy of Science of the Republic of Tajikistan, 28 gold deposits that contained total estimated resources of 429.3 t of gold had been identified. The Bol'shoy Kanimansur deposit, which is located in the north of Tajikistan, was reportedly the largest silver deposit in the CIS and also one of the largest in the world. The resources of antimony in Tajikistan are the largest in the CIS (Embassy of Tajikistan to Pakistan, undated).

Deposits of construction and decorative materials, such as marble, granite, limestone, and volcanic tuff, are located in the north of Tajikistan. Coal was mined at the Fan-Yagnob and Shurab coal deposits. The Maykhura tungsten deposit was being prepared for development in central Tajikistan 80 km north of Dushanbe. Reserves reportedly could provide for profitable production of 150,000 t/yr of ore (Ibrokhim and Dzhanobilov, 2007; Embassy of Tajikistan to Pakistan, undated).

In the south of Tajikistan 46 km to the north of the city of Kulyaba, the Chilkultan and the Davgir sectors of the Chaltazh

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strontium deposit had been explored and were being prepared for development. The country had lead and zinc deposits in the north of the country at the Altyn-Topkan and the Bol'shoy Kanimansur deposits. At the Anzob mining and beneficiation complex, which mined the Dzhizhikrutskoye antimony-mercury deposit, the completion of exploration at lower horizons of the deposit could provide data on reserves that could serve as a basis for doubling of its capacity if the necessary economic factors support development (Ibrokhim and Dzhanobilov, 2007).

The south of the country has resources of billions of tons of salt. The country had explored and prepared the Yakarkharskoye boron deposit for development; this deposit is reportedly the largest boron deposit in the CIS. The boron is contained in datolite and danburite ores (Ibrokhim and Dzhanobilov, 2007).

Tajikistan has a number of silver and gold deposits. Total silver in ore was estimated to be 60,000 t, and the largest deposit, the Bol'shoy Kanimansur, has about 38,000 t of silver in ore. There were more than 30 known gold deposits, of which only a few had been prospected.

Several potentially important coal deposits had been identified but had not yet been exploited. Although many deposits of coal were suitable for open pit mining, they are located in mountainous regions, which are subject to extreme weather conditions and where transportation routes are difficult or nonexistent (Embassy of Tajikistan to Pakistan, undated).

Production

In 2006, industrial production in Tajikistan increased by 4.9% compared with that of 2005, with production increasing by 20% in the construction materials sector, 9% in the nonferrous metals sector, and 0.9% in the fuel and energy sector. In the fuel sector, production of hard coal reportedly increased by 18.2% to 80,600 t; brown coal, by 5.2% to 21,800 t; and oil, by 3.2% to 22,300 t, but natural gas production decreased by 32% to 19.9 million cubic meters. In the construction materials sector, production of cement increased by 11.2% to 281,500 t, but gypsum production fell by 57.6% to 3,600 t (table 17; Interfax Russia & CIS Statistics Weekly, 2007).

Structure of the Mineral Industry

Besides TadAZ, only a few metal mining enterprises were still operating (table 18). These included the Anzob mining and beneficiation complex, which mined the Dzhikrutskoye antimony-mercury deposit, and the Adrasman mining and beneficiation complex, which developed copper-bismuth and lead-silver ores. Main output at Adrasman included concentrate with a lead content of 43% and a silver content of 5.943 g/t. The country also had enterprises that were engaged in gold mining and the extraction of coal, natural gas, and oil.

Commodity Review

Metals

Aluminum.—TadAZ, which was located in Tursunzade (formerly Regar), had a design capacity to produce 517,000 t/yr of aluminum. It was 100% dependent on imported alumina, consumed nearly 40% of the country's total power output, employed 12,000 workers, and indirectly supported a community of 100,000 (Interfax Russia & CIS Metals & Mining Weekly, 2007). TadAZ accounted for more than 5% of the country's total value of exports. Almost all the aluminum produced by TadAZ was exported. An estimated 5,000 t/yr of aluminum was consumed domestically to produce kitchenware and other household necessities (Embassy of Tajikistan to Pakistan, undated).

RUSAL and the Government of Tajikistan had signed an agreement in 2004 whereby RUSAL was to invest in the construction of the Roghun hydroelectric powerplant in Tajikistan. The plant was to provide power for an aluminum smelter that RUSAL planned to construct in southern Tajikistan. As part of the arrangement, RUSAL was also going to invest in renovating the TadAZ plant (Whetton, 2006).

In 2006, the Government of Tajikistan decided to complete the construction of the Roghun hydroelectric plant on its own and was planning to finance the construction of the Roghun hydroelectric plant from its own state budget funds. The Government planned to compete construction in 2007 (Interfax Russia & CIS Metals & Mining Weekly, 2007).

Lead and Zinc.—China Global New Technology Export and Import company purchased at auction in November the Altyn-Topkan mining and beneficiation complex in Sogdiyskaya Oblast and was investing in renovating the mine. The company, which had received a license for its development, planned to mine lead-zinc ore to produce concentrate. The initial production capacity of the complex reportedly would enable it to produce 250,000 t/yr of lead concentrate; this amount would be increased eventually to between 500,000 and 700,000 t/yr and then to 1 Mt/yr. Construction of the complex was scheduled to be completed in the beginning of 2009 (Metall Ukrainy, 2007).

The Altyn-Topkan mining enterprise was commissioned in 1954, and until 2000, ore mined at Altyn-Topkan was processed at the Almalyk mining and processing enterprise in Uzbekistan, which had concessionary control of Altyn-Topkan. As a result of the fall in lead and zinc prices in 2000, Almalyk ceased mining at Altyn-Topkan and turned control of Altyn-Topkan back to the Government of Tajikistan. At that time, production facilities at Altyn-Topkan were mothballed and remained so until the acquisition of the facility by China Global New Technology Export & Import (Metall Ukrainy, 2007).

Outlook

Tajikistan has significant mineral resources awaiting development, some of which could be used to supply markets in Asia. With the end of the civil war in the country in 1997, Tajikistan has been able to return to a period of peace and economic stability. However, the country still suffers from a lack of infrastructure. Development of mineral resources will depend on its ability to attract investors, which could require providing tax incentives, incentives for technological upgrades of production lines, and full hard currency convertibility (World Bank, The, 2006).

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References Cited

Embassy of Tajikistan to Pakistan, [undated], Mineral resources: Embassy of Tajikistan to Pakistan. (Accessed January 12, 2008, at http://www.tajikembassy.pk/abt_tjk/mineral.htm.)

Ibrokhim, A., and Dzhanobilov, M., 2007, Mineral'no-Sy'r'yevaya baza Tadzhikistana—Sostoyaniye, perspektivy osvoeniya i razvitiya [The mineral-raw material base of Tajikistan—The condition, and perspectives for its preparation and development]: Gornyy Zhurnal [Mining Journal], no. 10, p. 52-55.

Interfax Russia & CIS Metals & Mining Weekly, 2007, Tajikistan to spend $14.5 mln on Rogun power plant in 2007: Interfax Russia & CIS Metals & Mining Weekly, issue 4, January 19-25, p. 33.

Interfax Russia & CIS Statistics Weekly, 2007, Industrial production grew 4% year-on-year to 4.56 billion somoni in 2006: Interfax Russia & CIS Statistics Weekly, issue 5, January 20-26, p. 4.

Metall Ukrainy, 2007, Tadzhikistan: Metall Ukrainy [Metals of Ukraine], no. 24, December 16-31, p. 42.

Whetton, Chris, 2006, Global perspectives—Nuke renewal: Intech, July 13. (Accessed January 24, 2008, at http://www.isa.org/Content/ContentGroups/News/2006/July33/Global_perspectives__Nuke_renewal.htm.)

World Bank, The, 2006, Tajikistan—Country brief 2007: The World Bank, September. (Accessed March 4, 2008, at http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/ECAEXT/TAJIKISTANEXTN/0,,contentMDK:20630697~menuPK:287255~pagePK:141137~piPK:141127~theSitePK:258744,00.html.)

TURKMENISTAN

Although Turkmenistan produces a wide range of industrial minerals, its major mineral resources are its oil and gas reserves, and the country is a leading regional natural gas producer. Turkmenistan hosts several of the world's largest gasfields; they include the Dauletabad, which was brought into production in 1982, and the Shatlyk, which was brought into production in the early 1970s. Turkmenistan's oil refineries are the Seydi and the Turkmenbashy.

The country's leading nonfuel mineral enterprises were the Arpaklenskiy barite-witherite enterprise, the Cheleken ozokerite enterprise, the Gaurdak sulfur plant, the Karabogazsulfate Association, the Kara-Kum sulfur plant, and the Oglanly bentonite mining enterprise. One of the leading enterprises that extracted chemical raw materials was the Karabogazsulfate Association, which recovered salts from the Kara-Bogaz Gol lagoon off the Caspian Sea. The association produced bischofite, Caspian Sea salt, epsomite, Galauber's salt, and sodium sulfate. In the western part of the country, the Boyadagskoye, the Cheleken, and the Nebitdag deposits of iodine-bromine brines were being extracted and the brines were processed at the Cheleken and the Nebitdag iodine/bromine plants.

The country had discovered 149 gas and gas condensate deposits with total reported reserves of 5 trillion cubic meters of natural gas. Of these deposits, 139 deposits were located onshore and had reported reserves of 4.6 trillion cubic meters and 10 deposits were located on the Caspian Shelf and had reported reserves of 400 billion cubic meters. Fifty-four deposits with reported reserves of 2.6 trillion cubic meters and 11 deposits with reported reserves of 260 billion cubic meters were being prepared for development. Seventy-three deposits with reported reserves of 2 trillion cubic meters were under exploration, and 11 deposits with reported reserves of 140 billion cubic meters had been placed on hold. The majority of the country's reported natural gas reserves were located in the Dauletobad and the Shatlyk basins, and extraction had taken place at the major deposits for more than 15 years (Eder, 2007).

By the beginning of 2006, Turkmenistan had discovered 34 oil deposits and 82 gas condensate deposits, of which 20 oil deposits and 38 gas condensate deposits were under development. Four gas condensate deposits were being prepared for development, and exploration work was being conducted at 14 oil and 39 gas condensate deposits. The majority of oil reserves are located in the Southern Caspian oil and gas basin in the western part of the country (Eder, 2007).

Owing to a lack of adequate information about the country's oil and gas reserves and the lack of a complete international audit of reserves, the reserves numbers that have been published by a number of organizations outside Turkmenistan can only be considered estimates. Furthermore, a large portion of the country still had not undergone intensive exploration (Eder, 2007).

Future development of the country's oil and gas sector will depend primarily on the development of offshore oil and gas resources in the Caspian Sea. According to Turkmenistan's Ministry of the Oil and Gas Industries and Mineral Resources, Turkmenistan has resources 12 Gt of oil and 6.2 trillion cubic meters of natural gas in the Caspian Sea at depths of between 2,000 and 7,000 meters (Eder, 2007).

Production

Data on mineral production are in table 19.

Structure of the Mineral Industry

All mineral production enterprises were state owned and all deposits were being developed by enterprises subordinate to the state and its ministries. Based on a law passed in 1992, foreign firms were permitted to establish joint ventures only with state-owned companies. This law was changed in late 2007 to allow foreign investors the right to fully or partially own enterprises, as well as to own movable property and real estate. Ownership rights can be purchased from individuals as well as from legal entities registered in Turkmenistan (Interfax Russia & CIS Metals & Mining Weekly, 2007).

The role of foreign firms in the country's oil and gas production was less than 10%, although attracting foreign investment and the participation of foreign firms would likely be a major factor in the country increasing production on the Caspian shelf. In 2006, foreign firms increased oil production by 40% to 2.3 Mt (Eder, 2007).

Table 20 is a list of major mineral industry facilities in Turkmenistan.

Mineral Trade

Revenues from exports of natural gas and oil and oil products accounted for about 80% percent of Turkmenistan's merchandise exports as the country experienced a large inflow of revenue because of the high world market prices for oil. In 2006, Turkmenistan negotiated improved payment terms for its natural gas exports with Russia and Ukraine, which included

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eliminating barter settlements and an almost 50% increase in the export price. A 25-year gas export agreement signed with Russia in 2003 and a 30-year agreement signed with China in the spring of 2006 will likely enable Turkmenistan to maintain a steady stream of foreign exchange inflows (World Bank, The, 2007).

In 2006, Turkmenistan had two gas-export pipelines. One was a major pipeline route built in the Soviet-era that connected to the pipeline network in Russia and through which the majority of Turkmenistan's gas was exported. The other was a much smaller pipeline built in the post-Soviet period that linked to the pipeline network in Iran through which Turkmenistan exported about 8 billion cubic meters of gas annually to Iran. In 2007, Turkmenistan was to export 50 billion cubic meters of gas to Russia. Turkmenistan's gas flowed directly only to these countries (Pannier, 2008).

Commodity Review

Mineral Fuels

Natural Gas.—Gas production in Turkmenistan had fallen from a high of about 80 billion cubic meters per year in the 1980s to only 12 billion cubic meters in 1998 owing to the lack of permission to transport its gas to markets through the Russian pipeline network, which was the country's only available route to export gas. Domestic consumption of natural gas in 2006 was 17.8 billion cubic meters, and domestically produced natural gas was the country's chief source of energy. In 2006, Turkmenistan's net gas exports totaled about 50 billion cubic meters. The resolution of transport issues between Russia and Turkmenistan would enable Turkmenistan to increase its natural gas output (Eder, 2007).

The majority of the country's natural gas was produced in the southeastern part of Turkmenistan from the large Doviet-Denmez field, which produced of about 40 billion cubic meters per year and which had resources initially estimated to be 4.5 trillion cubic meters. Potential increases in natural gas production were expected to come from a group of fields associated with the Caspian Shelf on the right bank of the Amu Darya River and from the Yashlar-South-Iolotan group of fields, which includes the South-Iolotan deposit; this deposit has reserves reported to be 15 trillion cubic feet (more than 400 billion cubic meters) of natural gas and 17 Mt of oil, making it one of the largest deposits of natural gas in Central Asia (Eder, 2007).

Plans for 2007 called for Turkmenistan to increase gas production to 80 billion cubic meters or by more than 20% compared with that of 2006 and to increase oil production by more than 15% to 10.4 Mt. Turkmenistan planned to increase gas exports in 2007 to 58 billion cubic meters in accord with intergovernmental agreements. Turkmenistan would need to take additional measures, which would require major new investment to accelerate oilfield and gasfield development and construct transport infrastructure, to fulfill its signed delivery agreements (Interfax Oil and Gas Report, 2007).

Petroleum.—The country had raised oil and gas condensate production to about 9 Mt/yr after it fell from between 6 and 7 Mt/yr in the 1980s to about 4 Mt/yr in the mid-1990s. The country's major oil producer was the state company Tukmenneft'. The state company Turkmengaz produced more than 80% of the country's natural gas production and also produced oil and gas condensate (Eder, 2007).

Turkmenistan had an oil refining industry that was represented by the Seydi oil refinery and the Turkmenbashi complex of oil refineries (TKNZ), which had a total capacity of 12 Mt/yr. The refineries in 2006 were refining about 6.9 Mt of oil, with domestic consumption of refinery products varying between 3 and 5 Mt/yr in the past decade and reaching 5.3 Mt in 2006. In 2006, the country exported 4 Mt of crude oil and 1.6 Mt of refinery products (Eder, 2007).

Outlook

Exports of natural gas could at least double in coming years as new pipelines are completed to improve links to China, Russia, and other countries, including Pakistan. In the spring of 2007, Turkmenistan signed a pipeline deal with Kazakhstan and Russia to build a pipeline with a throughput capacity of at least 20 billion cubic meters annually along the northeastern shore of the Caspian Sea; this pipeline eventually would supply markets in Europe. This pipeline is expected to be operational by 2010. and possibly could supplant a proposed Trans-Caspian Gas Pipeline (TCGP), which would have supplied European markets but bypassed the Russian pipeline network. Besides the TCGP, a number of other alternate routes have been proposed that would enable Turkmenistan to export gas through routes that bypass Russia. It is possible that construction of one or more of these pipeline routes is still feasible. In April, Turkmenistan signed an agreement with China to begin exporting about 30 billion cubic meters of gas annually to China by way of a proposed pipeline that could be operational by the end of 2009 (Zissis, 2006; Abdurasulov, 2007).

To fulfill all its signed contracts for gas delivery, Turkmenistan is projected to have to increase its natural gas output to between 140 and 150 billion cubic meters per year by 2010 and to between 160 and 170 billion cubic meters per year in 2020 and, concomitantly, to increase gas exports to 95 billion cubic meters in 2010 and 135 billion cubic meters in 2020. Russia is expected to increase purchases of natural gas from Turkmenistan to 90 billion cubic meters per year after 2010 (Eder, 2007).

Turkmenistan's crude oil exports also could increase with increased oil production, with projections calling for crude oil exports to increase to 12 Mt in 2010 and 15 Mt in 2015. Projections called for crude oil production to increase to 19 Mt in 2010, 25 Mt in 2015, and to 30 Mt in 2020 (Eder, 2007).

References Cited

Abdurasulov, Abdujalil, 2007, Turkmenistan—Multiple gas pipelines still possible: Almaty, Kazakhstan, Environment News Service, May 24. (Accessed February 2, 2008, at http://www.ens-newswire.com/ens/may2007/2007-05-24-02.asp.)

Eder, L.V., 2007, Neftegazovyy kompleks Turkmenistana [The oil and gas complex of Turkmenistan]: Mineral'nye Resourcy Rossii: Ekonomika i Upravleniye [Mineral Resources of Russia: Economics and Management], no. 2, p. 72-80.

Interfax Oil and Gas Report, 2007, Turkmenistan aims to boost gas production 20%, oil 15% in 2007: Interfax Oil and Gas Report, issue 12, March 22-28, p. 48.

Digitized by Google

Interfax Russia & CIS Metals & Mining Weekly, 2007, Turkmenistan allows foreign investors to own property: Interfax Russia & CIS Metals & Mining Weekly, issue 42, November 12-18, p. 23.
Pannier, Bruce, 2008, Turkmenistan—"Gas rich" residents shiver in the cold: EURASIANET.org, February 2. (Accessed February 2, 2008, at http://www.eurasianet.org/departments/insight/articles/pp010708.shtml.)
World Bank, The, 2007, Turkmenistan—Country brief 2007: The World Bank. (Accessed January 12, 2008, at http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/ECAEXT/TURKMENISTANEXTN/0,,contentMDK:20631627~menuPK:300743~pagePK:141137~piPK:141127~theSitePK:300736,00.html#Economy.)
Zissis Carin, 2006, Which way will Turkmen gas flow?: Council on Foreign Relations, December 22. (Accessed February 2, 2008, at http://www.cfr.org/publication/12303/which_way_will_turkmen_gas_flow.html.)

UKRAINE

Ukraine was a major world producer of coal, ferroalloys, ilmenite, iron ore, manganese ore, and steel. The country's steel exports were of major importance on world markets. Other major mineral commodity exports were iron ore and ferroalloys. Ukraine had been a lesser producer of a number of other metallic mineral products, which included alumina, aluminum, cadmium, germanium, secondary lead, magnesium, mercury, nickel, rutile, uranium, secondary zinc, zircon, zirconium, and a large number of industrial minerals, which included dolomite, graphite, kaolin, limestone fluxes, potash, quartz, salt, soda ash, and a variety of building materials. Production of a number of these mineral products had decreased significantly or ceased since the dissolution of the Soviet Union. Ukraine is one of the world's leading energy transit countries, with large oil and gas pipeline networks that transport Russian and Caspian Sea oil and gas across its territory.

Minerals in the National Economy

The steel industry was a major component of Ukraine's economy, accounting for between 5% and 6% of the GDP and 34% of export revenues. It employed about 420,000 people, which constituted about 10% of industrial employment and about 2% of total employment. Energy demand in Ukraine was characterized by high energy intensity owing to the large share of heavy industry in the country's economy and industry's low level of energy efficiency, which made Ukraine's economy highly vulnerable to increases in oil and gas prices. Natural gas provided about 50% of the country's primary energy consumption, and domestic gas production met about 12% of the country's energy needs. The country has significant natural gas reserves and could increase production with adequate investment (World Bank, The, 2005).

Production

In 2006, the value of industrial production increased by 6.2% compared with that of 2005. The value of production in the extractive industries increased by 5.8%, which included a 9.4% increase in the mining of metallic ores, a 5.2% increase in oil and gas extraction, and a 2.8% increase in the mining of coal and peat. In the metallurgy and metal working sector, the value of production increased by 8.4%, which included a 12.8% increase for steel pipes; an 8.4% increase for pig iron, steel, and ferroalloys; and a 2.6% increase for nonferrous metals. In the chemical and petrochemical sector, the value of industrial production increased by 3% (table 21; Interfax Russia and CIS Statistics Weekly, 2007).

Structure of the Mineral Industry

The country's iron ore and steel production sector included 20 metal ware plants, 15 iron and steel works and plants, 15 tube producing enterprises,14 mining enterprises, 13 refractory production plants, 12 byproduct coke plants, and 3 ferroalloy plants (National Exhibition of Ukraine in the USA, 2006). Table 22 is a list of major mineral industry facilities in Ukraine.

Mineral Trade

Ukraine was among the world's three leading steel-exporting countries, with net exports of 27.8 Mt in 2006. Imports of oil and natural gas accounted for about 28% of the country's total imports, amounting to about $12.7 billion. A large amount of oil and natural gas destined for the EU and southeastern Europe was transported through Ukraine, including about 23% of the EU's oil imports and 46% of the EU's gas imports. Ukraine's trunk gas transport system was state owned and was the main transit route for Russian gas exports to Europe.

Tensions arose between Ukraine and Russia when Russia decided to charge Ukraine the world market rate for gas it consumed rather than the lower rate it had been charging. In early 2006, Russia began to increase natural gas prices for Ukraine toward prices charged in Western Europe. Ukraine claimed that the proposed almost fourfold price increase was politically motivated because of the "Orange Revolution" that had occurred in Ukraine and the country's election of a President perceived to be more politically oriented towards the West than towards Russia. Russia began cutting gas supplies to Ukraine in an energy price dispute that became a major political dispute. This crisis created fears that Russian exports to Western Europe could be affected, as most of the gas from Russia destined for Europe was channeled through Ukrainian pipelines and Ukraine was capable of diverting these supplies for its own needs. Russia insisted that there would be no disruption of supplies to Europe (BBC News, 2006).

An agreement reached between Russia and Ukraine set the gas import price at $95 per thousand cubic meters, which was a 64% increase from the previously prevailing price. Ukraine's gas sector had been controlled by Naftogaz, a state-owned enterprise. Naftogaz was Ukraine's largest firm in terms of assets, and supplied nearly all Ukraine's gas consumers through 2005. Beginning in 2006, however, as a result of the new gas contract between Ukraine and Russia, Ukraine's gas imports were to be handled by UkrGasEnergo (UGE), which was a joint venture between Naftogaz and a privately owned firm, RosUkrEnergo (RUE). RUE provided gas at the Ukraine-Russia border to UGE, which sold and distributed it to industrial consumers and to heating and power companies. The household market remained under the control of Naftogaz (Kramer, 2008).

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Metals

Aluminum.—Ukraine's aluminum industry consisted primarily of the Nikolayev alumina refinery and the Zaporozhye aluminum smelter (ZALK). The Nikolayev alumina refinery increased production from 2000 through 2006 by about 30% to 1.42 Mt from 1.1 Mt. Plans called for further expansion of alumina production facilities at Nikolayev, with alumina production in 2008 projected to reach between 1.6 and 1.7 Mt. The Zaporozhye aluminum smelter was built in 1933. It became part of Russia's SUAL in 2004 and then part of United Company RUSAL in 2007 with the merger of SUAL, RUSAL, and Glencore International AG. A large portion of the smelter's output was sold domestically to enterprises in the machine manufacturing sector. The main issue facing ZALK was obtaining an adequate supply of affordable energy. Prices for energy in Ukraine had risen to the extent that the director of the smelter stated that his enterprise could not remain competitive unless the Government lowered the price that it had set for ZALK's energy supplies (Metall Ukrainy, 2007).

Iron and Steel.—In 2006, Ukraine increased production of crude steel by about 5.9% to 40.899 Mt, but increased the production of finished rolled steel by less than 1% to 22.387 Mt. Projections for 2007 called for crude steel output to increase to 42 Mt (Interfax Russia & CIS Metals & Mining Weekly, 2007b). Strong demand for steel products globally had helped fuel Ukraine's economy as Ukrainian steel producers were among the lowest-cost steel producers in the world. Ukraine's abundant iron ore and manganese ore reserves, its large coal production and proximity to Russian coal supplies, and its developed transport infrastructure enabled Ukraine to be a major global steel producer. The year started with a number of difficulties facing the steel industry caused by the weather, a shortage of natural gas, and a weak international market. After the first quarter of the year, however, conditions improved as supplies of iron ore and scrap and natural gas increased. The world market demand for and price of steel also increased, which led to a revival of the country's steel production (Kharakhulakh, 2007).

The country's major steel producing enterprises each produced more than 4 Mt/yr of steel, with some producing more than 7 Mt/yr. Of the total volume of steel produced, 51.7% was produced by oxygen converter furnaces, 44.6% in open-hearth furnaces, and 3.7% in electric furnaces, which was the same ratio as in 2005 (Kharakhulakh, 2007). Ukraine's steel industry was undergoing a major transformation as major mills invested to modernize production facilities to achieve improved operational and environmental performance. Investments were being made to introduce pulverized coal injection to reduce coal use, replace open-hearth furnaces with oxygen converter furnaces, and develop inhouse power generation units to achieve energy self-sufficiency.

Because the steel industry was dominated by large producers, switching to electric furnaces for steel production was not considered realistic. Furthermore, the country's supply of steel scrap was quite limited. Also, plans that called for the introduction of more continuous casting of steel, which accounted for 30% of steel produced, would reduce the amount of turnaround scrap available. The availability of scrap could increase if depreciation rates on capital stock were accelerated and if the amount of scrap available from automobiles increases with increased car ownership (Krivchenko and others, 2007).

Iron Ore.—In 2006, Ukraine's iron ore mines increased their output of crude ore by 7.9% to 74 Mt; of concentrate, by 7% to 56.68 Mt; and of pellets, by 20% to 20.87 Mt. Sinter production remained level at 47.4 Mt. A number of iron ore mining enterprises increased their output, including the Poltavskiy mining and beneficiation complex, which was Ukraine's leading producer of iron ore pellets. In 2006, Poltavskiy increased iron ore concentrate production by 15.7% to 9.621 Mt, and commercial pellet production, by 10.2% to 8.55 Mt. Poltavskiy exported about 90% of its pellets, mainly to customers located in Europe (Austria, Bulgaria, the Czech Republic, Italy, Poland, Romania, and countries of the former Yugoslavia), but also to China. Switzerland's Ferrexpo AG owned 85.85% of Poltavsky as of mid-September 2006 (Interfax, 2007).

Output also increased at the Pivdenny (Southern) mining and beneficiation complex where iron ore concentrate production increased by 7% to 8.71 Mt and sinter output increased by 13.4% to 4.652 Mt in 2006. Pivdenny supplied Ukraine's steel mills with 3.703 Mt of concentrate and 4.655 Mt of sinter. The Pivnichny (Northern) mining and beneficiation complex increased its iron ore concentrate output by 12% to 11.963 Mt and its pellet production by 33.9% to 10.1 Mt, and the Donetsk-based System Capital Management (SCM) controlled 99% of its shares. The Tsentralnyy (Central) mining and beneficiation complex increased its concentrate production by 4.6% to 5.572 Mt and its pellet output by 3.1% to 2.217 Mt. Tsentralnyy sold most of its pellets to Ukrainian steel mills. SCM also controlled 99% of Tsentralnyy. The Kryvy Rih mining and beneficiation complex increased its iron ore output by 10% to 7.1 Mt, and the Zaporizhye mining and beneficiation complex increased its iron ore output by 2.7% to 4.32 Mt. Zaporizhye is a Ukrainian-Slovak joint venture and its main shareholders were Minerfin of Slovakia and Zaporizhstal, which was one of Ukraine's leading steel companies. It exported 60% of its ore to Austria, the Czech Republic, Poland, and Slovakia and sold the remaining 40% to Zaporizhstal (Interfax, 2007).

The output of iron ore concentrates at the Inhulets mining and beneficiation complex decreased by 3.6% to 13.013 Mt in 2006. Inhulets sold 12.59 Mt of concentrate to Ukrainian steel mills in 2006 and had a 77% share of the Ukrainian iron ore concentrate market. The Zaporizhia-based Smart Group controlled the plant (Interfax, 2007).

Manganese.—Ukraine was the leading producer of manganese ore in the CIS. Ukraine's two manganese producing enterprises, the Marganets and the Ordzhonikidze mining and beneficiation enterprises, were owned by the Privat Group, which also controlled the Stakhanov and the Zaporizhye ferroalloy plants. In 2006, Marganets produced 937,200 t of manganese concentrates and Ordzhonikidze produced 669,200 t of manganese concentrates and also produced 405,500 t of manganese sinter (Interfax Russia & CIS Metals & Mining Weekly, 2007g). Ukraine had 75% of the manganese reserves

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of the CIS. Explored reserves prepared for development were reportedly 2.26 Gt, which had an average manganese content of 23.1% (Goshovskiy, 2007).

Mineral Fuels and Related Materials

Coal.—In 2006, Ukraine increased production of raw coal by 1.7% to 75.824 Mt. Metallurgical coal production decreased compared with that of 2005 to 30.145 Mt, but steam coal production increased by 10.9% to 50.112 Mt (Interfax Russia & CIS Metals & Mining Weekly, 2007d). Plans called for increasing coal production to 100 Mt in 2008, with 50 new coal faces scheduled to go into production at the end of 2007 (Interfax Russia & CIS Metals & Mining Weekly, 2007a).

Ukraine's coal sector was mostly state owned, although Government participation was declining. Non-state-owned enterprises produced more than 35% of Ukraine's coal (World Bank, The, 2005). The country's coal mines were subject to chronic financial distress and only limited efforts had been made to improve their performance (International Monetary Fund, 2007).

In December 2005, Ukraine's Coal Industry Ministry selected seven of the most promising hard coal deposits with combined reserves in excess of 1 Gt for development. The seven new mines, if developed, would have a combined capacity to produce 17.7 Mt/yr of coal. Ukraine's energy strategy for the period to 2030, which was approved by the Government in 2006, called for increasing coal output to 130.3 Mt (Interfax Russia & CIS Metals & Mining Weekly, 2007f).

Ukraine's Coal Industry Ministry stated that Ukraine has explored brown coal reserves of between 6 and 8 Gt with an average ash content of 20%. Most of the reserves are located in the Dnipr basin, as well as in the Cherkassy, the Kharkiv, the Kirovohrad, the Poltava, and the Zhitomir regions. The Ministry planned to attract investors to develop deposits in the Dnipr brown coal basin, according to an investment proposal that it posted on its Web site on August 15, 2006. The proposal called for developing two deposits—the Aleksandriiskoye deposit, which has brown coal reserves reported to be 485 Mt, of which 63 Mt were considered suitable for open pit development, and the Verkhnedniprovskoye deposit, which has reported reserves of 236 Mt, for which the explored sections were considered suitable for open pit development. The Ministry calculated that these deposits have the potential to produce between 5 and 6 Mt/yr of brown coal by open pit mining. Mines at the deposits were projected to come onstream in 2 years once development begins (Interfax Russia & CIS Metals & Mining Report, 2007e).

Uranium.—Ukraine planned to increase uranium output from 800 t in 2006 to 1,400 t by 2010. Ukraine reportedly was mining only 30% of the uranium that it needed for its nuclear power generation at the Vostochnyy mining complex (VostGOK), which is located in Zheltye Vody in the Dnipropetrovsk region. VostGOK was mining the Michurinskoye, the Tsentralnoye, and the Vatutinskoye deposits in the Dnipropetrovsk and Kirovohrad regions, where 50% to 60% of the reserves had been depleted. Ore was processed in Zheltye Vody. Plans announced in March, which called for increasing uranium ore extraction by 120% by 2010 and by between 400% and 520% by 2020, were linked with the development of the Novokonstantinovskoye field in the Kirovohrad region (Interfax Russia & CIS Metals & Mining Weekly, 2007c).

Outlook

Ukraine's steel industry was a mainstay of its economy and a major source of export revenues. For Ukraine to remain competitive on the international steel market, the country would need to switch from energy-intensive costly technologies to technologies that reduce energy usage and costs and improve the quality of steel produced. This would require, in part, replacing open-hearth furnaces with oxygen converters and electric furnaces and greatly increasing the percentage of steel produced with continuous casting at existing enterprises, as well as at any new facilities (Krivchenko and others, 2007).

References Cited

BBC News, 2006, Russia cuts Ukraine gas supplies: BBC News, January 1. (Accessed February 1, 2008, at http://news.bbc.co.uk/1/hi/world/europe/4572712.stm.)

Goshovskiy, S.V., 2007, Mineral'no-syr'yevaya baza Ukrainy I ralizatsiya polozheniy gornoy khartii stran SNG [The mineral-raw material base for Ukraine and the fulfillment of the mining charter for the countries of the CIS]: Gornyy Zhurnal [Mining Journal], no. 10, p. 69-76.

Interfax, 2007, Ukrainian iron ore mines boosted output in 2006: Interfax. (Accessed February 13, 2008, at http://www.metall-forum.org/News/Ukrainian_iron_ore_mines_2006.pdf.)

Interfax Russia & CIS Metals & Mining Weekly, 2007a, Ukraine could raise coal production in 2008: Interfax Russia & CIS Metals & Mining Weekly, issue 39, September 14-20, p. 29.

Interfax Russia & CIS Metals & Mining Weekly, 2007b, Ukraine could raise steel roll output 7% in 2007: Interfax Russia & CIS Metals & Mining Weekly, issue 9, February 23-March 1, p. 40.

Interfax Russia & CIS Metals & Mining Weekly, 2007c, Ukraine plans to boost uranium production 75% in 3 years: Interfax Russia & CIS Metals & Mining Weekly, issue 4, January 19-25, p. 35.

Interfax Russia & CIS Metals & Mining Weekly, 2007d, Ukraine reduces coal production 5.2 % in Jan-July: Interfax Russia & CIS Metals & Mining Weekly, issue 31, July 27-August 2, p. 16.

Interfax Russia & CIS Metals & Mining Weekly, 2007e, Ukraine seeks investors to develop brown coal deposits: Interfax Russia & CIS Metals & Mining Weekly, issue 32, August 10-16, p. 28.

Interfax Russia & CIS Metals & Mining Weekly, 2007f, Ukrainian coal ministry to raise $790 mln to build Novosvetlovskaya mine: Interfax Russia & CIS Metals & Mining Weekly, issue 32, August 10-16, p. 18.

Interfax Russia & CIS Metals & Mining Weekly, 2007g, Ukrainian property fund demands review of manganese mine privatization: Interfax Russia & CIS Metals & Mining Weekly, issue 39, September 21-27, p. 19.

Interfax Russia & CIS Statistics Weekly, 2007, Industrial production in Ukraine up 6.2% in 2006: Interfax Russia & CIS Statistics Weekly, issue 13-14, March 17-30, p. 26.

International Monetary Fund, 2007, Ukraine—Selected issues: International Monetary Fund Country Report No. 07/47, February, p. 6, 20.

Kharakhulakh, V.S., 2007, Predpriyatiya "Metallurgproma": proizvodstvo, eknomika, tekhperevooruzheniye [Enterprises of "Metallurgprom: production, economics, and technical reequipping]: Metallurgicheskaya I gornorudnaya promyshlennost' [The Metallurgical and Mining Industry], no. 2, p. 1-4.

Kramer, A.M., 2008, Russia—Gazprom-Ukraine gas dispute: The New York Times, January 29. (Accessed February 2, 2008, at http://www.nytimes.com/2008/01/29/business/worldbusiness/29fobriefs-GAZPROMUKRAI_BRF.html?ref= worldbusiness&oref=slogin.)

Krivchenko, Yu.S, Malik, A.A., Orman, V.Ya., and Filyak, A.V., 2007, Osnovnye napravleniya I perspektivy razvitiya staleplavil'nogo proizvodstva v Ukraine [Basic directions and perspectives for the development of the steel production in Ukraine]: Metellurgicheskaya i Gornorudnaya Promyshlennost' [The Metallurgical and Mining Industry], no. 1, p. 16-18.

Digitized by Google

Metall Ukrainy, 2007, Tsvetnye metally [Nonferrous metals]: Metall Ukrainy [Metals of Ukraine], no. 24, December 16-31, p. 59, 60.
National Exhibition of Ukraine in the USA, 2006, Modern economic potential of Ukraine: National Exhibition of Ukraine in the USA, December. (Accessed February 13, 2008, at http://www.ukrdzi.com/usa/uapotential/3201.htm.)
World Bank, The, 2005, Ukraine—The impact of higher natural gas and oil prices: World Bank Staff Report, December.

UZBEKISTAN

Although Uzbekistan was a significant regional producer of a number of mineral commodities, including nonferrous metals and natural gas, it was a major world producer of two mineral commodities, gold and uranium. Minerals were extracted from more than 400 mines, open pits, and oil wells. The two leading mineral production enterprises in the country were the Almalyk and the Navoi mining and metallurgical complexes.

Production

Data on mineral production are in table 23.

Structure of the Mineral Industry

Table 24 is a list of major mineral industry facilities in Uzbekistan.

Commodity Review

Metals

Copper.—The Almalyk complex was based on a large copper porphyry deposit that contained copper reserves of more than 17 Mt. In more than 50 years of mining, only about 20% of Almalyk's copper reserves (calculated according to the Soviet reserve classification system) had been depleted. The Almalyk complex was processing about 30 Mt/yr of ore, and the metallurgical plant had the potential to significantly increase production. Besides copper, ore from Almalyk contained gold, rhenium, selenium, silver, sulfur, and tellurium. Production of these byproduct metals comprised 40% of the value of Almalyk's output (Mavlyanov and others, 2007).

Gold.—The country's main reserves of gold and uranium are located in the Central Kyzykum region between the Amu Darya and the Syr Darya rivers. The ores are mined and processed by the Navoi mining and metallurgical complex. The Navoi complex had more than 20 gold deposits in western Uzbekistan, of which the largest by far is the Muruntau deposit, which is one of the world's largest gold deposits. Gold from this deposit was mined from an open pit. Navoi's gold production had averaged between 57 and 60 t/yr in recent years. Navoi also shared production from the Zarafshan-Newmont joint venture, which was formed by Navoi, Newmont Gold Corp. of the United States, and the Uzbekistan State Committee for Geology and Mineral Resources (Goskomgeologia).

The Zarafshan-Newmont joint venture recycled tailings generated from the Muruntau gold lode. The processing plant was officially opened on May 25, 1995. The joint venture initially contracted to process 220 Mt of ore averaging 1.23 g/t gold and containing 5.1 million troy ounces (158.63 t) of recoverable gold. Zarafshan-Newmont employed about 900 people. The joint venture produced 7.192 t of gold in 2006, which was a decrease from the 7.714 t produced in 2005 and the 12 t produced in 2004 (Interfax Russia & CIS Metals & Mining Weekly, 2007b).

On August 11, the Government of Uzbekistan launched a criminal investigation against the joint venture and its employees and blocked the export of any gold. Newmont lost control over day-to-day operations of the joint venture, but the company continued to mine and process gold. Uzbekistan notified the company in March that tax reforms were in process and, in June, Uzbekistan's courts had ordered Zarafshan-Newmont to pay $48 million in back taxes, froze the joint venture's assets, and seized some of its gold (Radio Free Europe/Radio Liberty, 2006).

In September, Newmont wrote off the value of its stake in the joint venture, two months after authorities seized gold and other assets based on two tax claims for payments due between 2002 and 2005. An Uzbekistan court seized $49 million for the disputed tax claims and declared the joint venture bankrupt. However, Newmont was still pursuing a settlement in 2006. It reached an agreement in 2007 whereby it agreed to transfer its stake in the Zarafshan-Newmont venture to Uzbekistan with none of the parties admitting liability regarding any matters in the dispute (Reuters, 2007). According to the agreement, Newmont received $80 million for its 50% stake, which reportedly was less than its estimated book value. The operation planned to continue to process tailings from Muruntau (Interfax Russia & CIS Metals & Mining Weekly, 2007b).

Lead and Zinc.—Almalyk in 2007 was producing zinc metal at its zinc smelter on a tolling basis. Almalyk, however, had started to develop a lead and zinc mining and beneficiation complex to develop the Uchkulach lead-zinc deposit where Almalyk had a mothballed mine. Almalyk was also planning to develop the Khandiza polymetallic ore deposit. The beneficiation plant at the Uchkulach Mine would be capable of processing 500,000 t/yr of ore, and the beneficiation plant at the Khandiza Mine would be able to process 650,000 t/yr of ore. Plans called for the complex to begin operations in 2009 (Interfax Russia & CIS Metals & Mining Weekly, 2007a).

Mineral Fuels and Related Materials

Uranium.—The Navoi mining and metallurgical complex was the country's only complex for mining and enriching uranium. Navoi incorporated three enterprises that mined uranium using in situ leaching. Uranium was milled at its No. 1 Hydrometallurgical Plant in the city of Navoi (Interfax, 2007). In 2006, the Navoi mining and metallurgical complex produced 2,260 t of uranium, which was 1.7% less than the 2,300 t it produced in 2005. The decline in output was attributed to a lack of financing, which resulted in technological and supply problems and, in particular, a lack of sulfuric acid (Interfax, 2007).

Outlook

The U.S. Department of State stated that Uzbekistan had the lowest level of foreign direct investment per capita among

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members of the CIS. The action taken against Newmont could make it more difficult for Uzbekistan to attract major foreign investment to develop its mineral resources.

References Cited

Interfax Russia & CIS Metals & Mining Weekly, 2007a, Uzbekistan's Almalyk starts developing Khandiza, Uch-Kulahc deposits: Interfax Russia & CIS Metals & Mining Weekly, issue 33, August 17-23, p. 10.

Interfax Russia & CIS Metals & Mining Weekly, 2007b, Uzbekistan to liquidate Zerafshan-Newmont Gold JV: Interfax Russia & CIS Metals & Mining Weekly, issue 32, August 3-9, p. 5.

Interfax, 2007, Navoi mining and metals plant uranium production down 1.8% in 2006: Interfax, January 9. (Accessed November 21, 2007, at https://www.opensource.gov/portal/server.t?CommunityID=240&control=SetCommunity&cached=true&space=CommunityPage.)

Mavlyanov, N.G., Turamradov, I.B., and Isakhodzhaey, B.A., 2007, Mineral'no-syr'yevaya baza Respubliki Uzbekistana [The mineral raw material base of the Republic of Uzbekistan]: Gornyy Zhurnal [Mining Journal], no. 10, p. 63-68.

Radio Free Europe/Radio Liberty, 2006, Uzbekistan: Government takes on U.S. gold mining company: Radio Free Europe/Radio Liberty, August 15. (Accessed February 20, 2008, at http://www.rferl.org/featuresarticle/2006/08/6fde678c-57f5-4490-aab9-2647f63d2d0a.html.)

Reuters, 2007, Update 2—Newmont sets Uzbek deal on mine seizure: Reuters, July 11. (Accessed February 20, 2008, at http://uk.reuters.com/article/companyNews/idUKN1138458120070711.)

TABLE 1
ARMENIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006
METALS						
Aluminum:						
Rolled		-- [r]	-- [r]	-- [r]	--	--
Foil		5,240	9,317	6,193	--	950
Copper:						
Concentrate, Cu content		16,641	18,068	17,700 [e]	16,256	15,000
Blister, smelter, primary[e]		6,700	7,500	7,500	9,881 [r, 2]	8,791 [2]
Ferroalloys:						
Ferromolybdenum		NA	NA	NA	2,260	2,581
Ferrotungsten		NA	NA	NA	8	42
Gold, mine output, Au content	kilograms	3,200	1,800	2,100	1,400	1,400
Molybdenum:						
Concentrate, Mo content		2,884	2,763	2,950 [e]	3,030	4,098
Metal		NA	NA	NA	270	487
Rhenium[e]	kilograms	800	1,000	1,000	1,200	1,000
Silver[e]	do.	5,500	4,000	4,000	4,000	4,000
Zinc, concentrate, Zn content		782	2,056	1,927	3,196	2,270
INDUSTRIAL MINERALS						
Caustic soda		3,600	1,800	2,800	6,200	6,500
Cement	thousand metric tons	355	384	501	605	625
Clays, bentonite, powder		258	642 [e]	700	732 [r]	720
Diamond, cut	thousand carats	370	400	263	222 [r]	184
Gypsum		44,900	57,800	65,000	44,200	40,000
Limestone	thousand metric tons	12,500	13,000	16,000 [e]	17,000	17,000 [e]
Perlite[e]		35,000	35,000	35,000	35,000	35,000
Salt		30,300	31,900	31,600	34,700	37,000
MINERAL FUELS AND RELATED MATERIALS						
Natural gas, dry	million cubic meters	NA	NA	NA	NA	1,596 [p]

[e]Estimated; estimated data are rounded to no more than three significant digits. [p]Preliminary. [r]Revised. NA Not available. -- Zero.
[1]Table includes data available through November 2007.
[2]Reported figure.

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TABLE 2
ARMENIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1, 2]

(Metric tons unless otherwise specified)

Commodity		Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Aluminum, rolled and foil		ARMENAL (formerly Kanaker aluminum plant) (RUSAL)	K'anak'err	25,000
Copper:				
Mine output, Cu content		Facilities in operation:		30,000 [3]
		Agarak copper-molybdenum mining and processing complex	Agarak	
		Kapan mining directorate	Kapan	
		Zangezur copper-molybdenum complex [CJSC Armenian Copper Programme (ACP), 90%]	Kadzharan	
		Facilities not in operation:		
		Akhtala mining directorate	Akhtala	
		Shamlugh mining directorate	Shamlugh	
Blister		CJSC Armenian Copper Programme (ACP)	Alaverdi	15,000
Diamond, cut stones		Aghavni diamond-cutting works[4]	Nor Geghi	NA
Do.		Amma group diamond-cutting works[4]	Artashat	NA
Do.		Andranik-Dashk diamond-cutting works	Nor Hachyn	NA
Do.		Arevakn diamond producing plant	do.	NA
Do.		Diamond Company of Armenia (DCA)	Yerevan	NA
Do.		Diamond Tech	Talin	NA
Do.		Lori diamond-cutting works	Nor Hachyn	NA
Do.		Lusampor[4]	Melik'gyugh	NA
Do.		Punji diamond-cutting works[4]	Yerevan	NA
Do.		Sapphire diamond-cutting works	Nor Hachyn	NA
Do.	thousand carats	Shoghakan gem-cutting plant	do.	120
Gold	kilograms	Zod mining complex	Zod	2,000
Do.		Megradzor deposit	Megradzor	NA
Do.		Lichkvazkoye, Shaumyanskiy Rayon, Sotkskoye, and Terterasarskoye deposits	NA	NA
Iron ore		Hrazdan deposit	Sulagyan Mountains	NA
Molybdenum, mine output, Mo content		Zangezur copper-molybdenum complex (Cronimet Mining, 60%; Yerevan Pure Iron Works, 15%; Armenian Molybdenum Production, 12.5%; LLC Zangezur Mining, 12.5%)	Kadzharan	20,400
Do.		Agarak copper-molybdenum mining and processing complex	Agarak	2,000
Perlite	thousand metric tons	Aragats-Perlite mining-beneficiation complex	Aragats deposit	1,110
Zinc, mine output, Zn content		Kapan mining directorate	Kapan	NA

[e]Estimated; estimated data are rounded to no more than three significant digits. NA Not available.

[1]Table includes data available through November 2007.

[2]Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.

[3]Capacity estimates are totals for all enterprises that produce that commodity.

[4]Current existence of the enterprise cannot be confirmed.

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TABLE 3
AZERBAIJAN: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2002	2003	2004	2005	2006
METALS						
Alumina	thousand metric tons	91	180	232	315	363
Aluminum, primary and secondary		--	18,565	29,537	31,762	31,852
Iron ore, marketable:						
Gross weight		400 e	3,100	19,100	7,300	11,300
Fe content[e]		230	1,800	11,100	3,650	5,650
Steel:						
Crude		32,671 r	56,354 r	90,410 r	286,117 r	54,309
Pipes		2,545	5,400	84	1,257	14,108
INDUSTRIAL MINERALS						
Bentonite		NA	NA	NA	53,700	40,600
Bromine[e, 3]		2,000	2,000	2,000	2,000	2,000
Caustic soda		20,500	21,600	24,700	30,000	30,000
Cement		847,700	1,012,700	1,427,500	1,537,900 r	1,622,000
Gypsum		1,039	3,848	8,840	28,242	35,034
Iodine[3]		377	349	300	300	300
Limestone		631,500	762,000	1,273,000	1,256,443	1,416,038
Salt		5,380	7,645	9,234	11,202 r	12,029
Sand, construction	thousand metric tons	482,200	516,600	684,110	662,410	715,500
Sulfuric acid		17,000	22,500	26,400 r	18,800 r	22,000
MINERAL FUELS AND RELATED MATERIALS						
Natural gas	thousand cubic meters	5,143,700	5,127,700	4,995,400	5,732,100	6,079,500
Petroleum:						
Crude		15,333,500	15,251,300	15,348,800	21,993,600	32,185,600
Refinery products		6,051,900	6,156,400	6,607,200	7,655,900	7,795,800

[e]Estimated; estimated data are rounded to no more than three significant digits. [r]Revised. NA Not available. -- Zero.

[1]Table includes data available through November 2007.

[2]In addition to the commodities listed, Azerbaijan also produced copper, gold, lead, molybdenum, silver, and zinc, and a number of industrial minerals, but available information is inadequate to make reliable estimates of output.

[3]Bromine and iodine production series in table may be revised in the 2007 report based on recent information reported in the text of this report.

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TABLE 4
AZERBAIJAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1, 2]

(Metric tons unless otherwise specified)

Commodity		Major operating companies, main facilities, or deposits	Locations or deposit names	Annual capacity[e]
Alumina		Gyandzha refinery	Ganca	100,000
Aluminum	thousand metric tons	Sumgait smelter	Sumqayit	100 to 150
Alunite ore		Zaglik alunite mining directorate	Zaglik, Dashcasan Region	600,000
Arsenic		Bitibulagh enargite deposit	Gedabay	NA
Do.		Daridagh red orpiment-realgar deposit	Julpha	NA
Do.		NA	Dzhul'finskiy Region	NA
Barite		Azad, Bashgishlag, Chaycand, Chovdar, Gusgchu, Tonashen, and Zaylik deposits	Khanlarskiy Region	NA
Bauxite		Permian deposit	Nakhichevan Region	NA
Cement		Plants: Karadagly Tauz	Locations: Karadagly Tauz Region	1,000,000 [3]
Chromite		Epack, Goydara, Kazimbinasy, Khatavang	Calbajar and Lachin Regions	NA
Clays:				
Bentonite		Dash-Salakhlinskoye deposit	do.	1,000,000
Refractory		Chardakhla deposit	Chardakhla	NA
Construction materials, includes building sawn stone-block and facing stone		Aidagh, Dash Salahly, Dilagarda, Dovlatyarly, Gozdak, Mardacan, Naftalan, Shahbulag, Zayam, Dashcasan, Gulably, Gulbacht, and Shahtahty deposits	NA	320,000 [3]
Copper		Karadagskiy complex	Shamkhorskiy Region	30,000
Dolomite		Negram and Kobustan deposits	do.	NA
Gemstones, precious and semiprecious		Agate, chalcedony, and heliotrope deposits	Santon	NA
Do.		Amethyst, garnet, and granite deposits	Gedebey Rayonu	NA
Gypsum		Deposits: Agdjakend deposit Araz deposit Jukhary Aghjacand anhydrite deposit	Locations: Kazakhskiy Region Nakhichevan Region Goranboy Region	40,600 [3]
Iodine and bromine		Baku, Karadagly, and Novaneftechala plants	Process oil well brines at plants in Baku, Karadagly, and Neftechala	NA
Iron ore, marketable		Dashkasan mining directorate	Dashkasan Region	1,400,000
Lead-zinc ore		Gumushlu deposit	Ordubadskiy and Norashenskiy Regions	NA
Limestone		Dashkesan deposit	Dashkasan Region	NA
Natural gas, processing		Karadagly plant	Near Baku	NA
Quartz sands		Miocene-Pliocene deposits	Gobustan, Absheron Peninsula, Guba Region	10,000
Petroleum, crude and natural gas:[4]				
Crude petroleum and gas condensate		State Oil Company of Azerbaijan Republic (SOCAR) in conjunction with international production-sharing agreements	Production from 37 onshore deposits, which includes deposits on the Ashperon Peninsula and in the Izhnekurin Valley	3,000,000 [3]
Do.		do.	Production from 17 offshore fields and almost 50% of crude petroleum produced from the Guneshli field	19,000,000 [3]
Natural gas	million cubic meters	Azneft, a subsidiary of State Oil Company of Azerbaijan Republic (SOCAR) in conjunction with international production-sharing agreements	Almost all production from offshore fields with more than 50% of natural gas produced from the Bakharly field	6,000 [3]
Do.		do.	Guneshli, Nakhchyvan, and Shah-Deniz offshore fields	NA
Petroleum, refined	24-gallon barrels	Azerneftyag (formerly Baku) refinery	Baku	83,950,000 [4]
Do.	do.	Heydar Aliev (formerly Azernefteyagandzhah and Novo-Baku refinery)	do.	77,380,000 [4]

See footnotes at end of table.

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TABLE 4—Continued
AZERBAIJAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Locations or deposit names	Annual capacity[e]
Rock salt	Hehram and Pusyan deposits	Nakhichevan Region	2,500,000
Steel:			
Crude	OAO Azerboru	Sumqayit	800,000
Rolled	do.	do.	700,000
Pipe, tubes	do.	do.	540,000

[e]Estimated; estimated data are rounded to no more than three significant digits. NA Not available.
[1]Table includes data available through November 2007.
[2]Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.
[3]Capacity estimates are totals for all enterprises that produce that commodity.
[4]Capacity for crude petroleum distillation.

TABLE 5
BELARUS: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006
METALS						
Steel:						
Crude	thousand metric tons	1,607	1,694	1,920	2,076	2,200 [e]
Rolled	do.	1,400	1,425	1,580	1,850 [r]	2,048
Pipes		76,700	96,200	109,700	108,300	117,132
INDUSTRIAL MINERALS						
Cement	thousand metric tons	2,171	2,472	2,731	3,131	3,495
Diamond, synthetic[e]	thousand carats	25,000	25,000	25,000	25,000	25,000
Nitrogen, N content of ammonia		799,000	726,000	765,000 [r, e]	800,000 [r]	850,000 [e]
Potash, K_2O equivalent[e]	thousand metric tons	3,800	4,230	4,600	4,844 [2]	4,605 [2]
Salt[3]		1,369,000 [r]	1,543,000	1,883,000	1,839,000	1,900,000 [e]
Sulfur[e]		25,000	30,000	30,000	30,000	30,000
MINERAL FUELS AND RELATED MATERIALS						
Natural gas	million cubic meters	246	254	245	228	220
Peat:						
Horticultural use[e]		200,000 [2]	100,000	100,000	100,000	100,000
Fuel use		2,201,000	1,802,000	2,008,000	2,308,000	2,400,000 [e]
Total		2,401,000	1,902,000	2,108,000	2,408,000	2,500,000 [e]
Petroleum:						
Crude	thousand metric tons	1,846	1,820	1,804	1,785	1,780
Refined	do.	15,247	15,774	18,451	19,802	21,253

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. -- Zero.
[1]Table includes data available through November 2007.
[2]Reported figure.
[3]Includes byproduct salt from potash production.

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TABLE 6
BELARUS: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Cement	Krichevskiy and Volkovysk plants	Mahilyowskaya and Wawkavysk Voblasts'	3,500,000
Diamond	Gomel Production Association "Kristall"	Homyel'skaya Voblasts'	NA
Nitrogen, N content of ammonia	Grodno "Azot" Association	Hrodna Region	1,000,000
Peat, fuel use	37 enterprises that produce mainly briquets	All regions of the country	5,000,000 [2]
Petroleum:			
Crude	Belarusneft Association	Southeastern part of the country	2,000,000
Refined	Mazyr refinery	Mazyr	16,000,000 [3]
Do.	Naftan refinery	Navapolatsk	8,450,000 [3]
Potash, K_2O equivalent	Belaruskali Production Amalgamation (PA)	Salihorsk area	5,000,000
Steel:			
Crude	Belarusian Steelworks	Zhlobin	1,400,000
Pipe	Mogilev Metallurgical Works jsc	Mahilyowskaya Voblasts'	80,000

[e]Estimated; estimated data are rounded to no more than three significant digits. NA Not available.
[1]Table includes data available through November 2007.
[2]Total peat for fuel use.
[3]Crude throughput.

TABLE 7
GEORGIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006
METALS						
Copper, mine output, Cu content of concentrate[e]		10,000	12,000	12,000	12,000	12,000
Gold[e]	kilograms	2,000	2,000	2,000	2,000	2,000
Iron and steel:						
Ferroalloys, electric furnace:						
Ferromanganese		NA [r]	12,400 [r]	12,800 [r]	13,945 [r]	5,130
Silicomanganese		NA [r]	50,900 [r]	91,900 [r]	109,414 [r]	116,945
Total		NA [r]	63,300 [r]	104,700 [r]	123,359 [r]	122,075
Lead, mine output, Pb content[e]		400	400	400	400	400
Manganese ore, marketable:						
Gross weight		103,400	173,500	218,700	251,800	328,643
Mn content[e]		30,000	50,500	63,600	73,000	95,300
Silver[e]	kilograms	33,000	33,000	33,000	33,000	33,000
Zinc, mine output, Zn content of concentrate[e]		400	400	400	400	400
INDUSTRIAL MINERALS						
Barite[e]		NA	NA	NA	NA	NA
Cement		346,800	344,800	424,600	450,000	450,000 [e]
Clays, bentonite[e]		7,000	9,700	1,800	7,876 [r, 2]	4,487 [2]
Gypsum		NA	NA	NA	238	123
Nitrogen, N content of ammonia		91,500	102,300	107,800	130,000 [e]	140,000 [e]
Perlite		NA	NA	45,000 [e]	45,000 [e]	45,000 [e]
Salt[e]		30,000	30,000	30,000	30,000	30,000
Zeolites		NA	NA	NA	NA	NA
MINERAL FUELS AND RELATED MATERIALS						
Coal, bituminous		6,100	8,000	8,000	5,100 [r]	8,284
Natural gas	thousand cubic meters	16,700	17,800	6,100	14,800	21,400
Petroleum:						
Crude		73,900	139,700	97,600	66,700	63,506
Refined		16,700	18,600	37,500	40,000	40,000

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. NA Not available.
[1]Table includes data available through November 2007.
[2]Reported figure.

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TABLE 8
GEORGIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1, 2]

(Metric tons)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Arsenic:	Deposits:	Locations:	2,000 [3]
As content of ore	Lukhumi deposit	Ambrolauri Region	
	Tsani deposit	Lentekhi Region	
Metal and compounds	Racha mining and chemical plant	Racha	NA
Do.	Tsana mining and chemical plant	Ts'ana	NA
Barite	Chordskoye deposit	Onis Raioni (Onskiy Rayon)	70,000
Do.	NA	Madneuli deposit	NA
Barite-zinc	NA	Kvaisi deposit	NA
Bentonite	Gumbrskoye and Askanskoye deposits	Gumbra and Askana Regions	200,000 [3]
Cement	Rust'avi cement plant	Rust'avi	1,500,000
Coal	Akhaltsikhe, Tkibuli-Shaorskoye, and Tkvarchelskoye deposits	Akhalts'ikhis Raioni, Tqibuli, and Tqvrach'eli Regions	300,000 [3]
Copper, Cu content of ore	Madneuli complex (Stanton Equity Corp., a subsidiary of International Investor Group of Russia)	Bolnisi Region	12,000
Diatomite	Kisatibskoye deposit	K'isat'ibi Region	150,000
Ferroalloys:			
Ferromanganese	Zestafoni plant (Stemcor UK Ltd.)	Zestap'onis Raioni	100,000
Silicomanganese	do.	do.	250,000
Manganese sinter	do.	do.	250,000
Gold, mill	Quartzite enterprise	Madneuli deposit	3
Iron ore	Hrazdan deposit	Sulagyan Mountains	NA
Do.	Tkibuli-Shaorskoye deposit	Tqibuli Region	NA
Lead-zinc:			
Pb content of ore	Kvaisi deposit	Kvaisi	1,200
Zn content of ore	do.	do.	3,000
Manganese, marketable ore	Chiaturmarganets complex (Manganese Georgia, a subsidiary of Stemcor UK Ltd.)	Chiatura-Sach'kheris Raioni field	400,000
Petroleum:			
Crude	About 60 wells that account for 98% of output	Mirzaani, Sup'sa, and Zemo T'elet'i Regions	200,000 [3]
Refined	Batumi refinery	Bat'umi	NA
Do.	Sartichala refinery	Sartichala	NA
Steel, crude	Rust'avi steel mill	Rust'avi	1,400,000

[e]Estimated; estimated data are rounded to no more than three significant digits. NA Not available.
[1]Table includes data available through November 2007.
[2]Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.
[3]Capacity estimate is the total for all enterprises that produce that commodity.

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TABLE 9
KAZAKHSTAN: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006
METALS						
Aluminum:						
Alumina	thousand metric tons	1,386	1,419	1,468	1,505	1,514
Bauxite		4,376,600	4,737,100	4,705,600	4,800,000 e	4,800,000 e
Arsenic trioxide e		1,500	1,500	1,500	1,500	1,500
Bismuth: e						
Mine output, Bi content		161	150	150	140	140
Metal, refined		130	130	130	120	115
Cadmium, metal		1,300	1,351	1,900	2,000	2,000 e
Chromite		2,369,400	2,927,500	3,287,000	3,579,000	3,600,000 e
Copper:						
Mine output, Cu content e		474,000	485,000	461,000 2	422,000 r	457,000
Metal:						
Smelter, undifferentiated		446,200	431,930	445,200	426,000 r	426,000 e
Refined, primary		453,000	432,901 r	445,200 r	388,000 r	408,000
Gallium e		15 r	10 r	5	7	10
Gold:						
Mine output, Au content	kilograms	22,402	30,000 e	30,000 e	18,062	18,000 e
Metal, refined	do.	10,959	9,906	9,576	9,788	NA
Iron and steel:						
Iron ore, marketable:						
Gross weight		17,675,000	19,300,000	20,300,000	16,469,900	18,600,000 e
Fe content		10,000,000	10,933,000	11,499,000	9,300,000 e	10,500,000 e
Metal:						
Pig iron		4,089,100	4,140,000 e	4,300,000	3,581,090	3,400,000 e
Ferroalloys:						
Ferrochromium		835,800	993,000	1,080,993 r	1,156,168	1,200,000 e
Ferrochromiumsilicon		108,028	98,130	104,800	97,870	100,000 e
Ferromanganese		2,278	1,931	2,000 e	2,100 e	2,100 e
Ferrosilicon		126,968	127,300	103,580	104,185	105,000 e
Silicomanganese		164,000	178,920	155,324 r	170,214	220,000 e
Other e		9,000	9,000	9,000	9,000	9,000
Total		1,246,074	1,408,281	1,455,697 r	1,539,537	1,640,000 e
Steel:						
Crude		4,868,000	5,066,600	5,371,700	4,452,000	4,225,000
Finished, rolled		3,800,000	3,837,800	4,039,700	3,392,000 r	3,163,000
Lead:						
Concentrate, Pb content e		40,000 r	44,000 r	44,000 r	44,000	48,000
Refined, primary and secondary		1,622,000	133,200	157,000 e	131,316	125,000
Magnesium, metal, primary e		18,000	14,000	18,000	20,000	21,000
Manganese ore, crude ore:						
Gross weight		1,792,200 r	2,361,000 r	2,318,000	2,207,700	2,250,000
Mn content e		440,000 r	580,000	570,000	540,000	550,000
Molybdenum, concentrate, Mo content e		230	230	230	230	250
Nickel, Ni content of laterite ore		--	--	--	193	200 e
Rhenium e	kilograms	2,600	2,600	5,000	8,000	8,000
Silicon		NA	83,000	88,000	95,000	95,000
Silver, mine output, Ag content	kilograms	855,612	804,874	707,443	832,000	830,000 e
Titanium:						
Ilmenite and leucoxene		--	9,300	11,670	10,000	25,000
Sponge		14,900	12,500	16,500	19,000	23,000
Vanadium, ores, concentrates, slag, Va content e		1,000	1,000	1,000	1,000	1,000
Zinc:						
Mine output, Zn content		390,000 r	395,000 r	360,000 r	400,000	400,000 e
Smelter, primary and secondary		286,300 r	279,000 r	316,500 r	356,907	349,000

See footnotes at end of table.

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TABLE 9—Continued
KAZAKHSTAN: PRODUCTION OF MINERAL COMMODITIES[1, 2]

(Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006
INDUSTRIAL MINERALS						
Asbestos, all grades		291,100	354,500	346,500	355,000	355,000 e
Barite		79,000	219,200	310,700	120,000	120,000 e
Boron[e]	thousand metric tons	30	30	30	30	30
Cement		2,129,400	2,569,700	3,662,000	3,974,800	4,200,000 e
Clays, kaolin[e]		70,000	70,000	70,000	70,000	70,000
Gypsum		710,700	711,000 e	800,000	820,000	820,000
Phophate rock:						
Gross weight		136,500	169,000 r	230,000 r	263,000 r	270,000 e
P_2O_5 content		39,600	38,000 r	52,000 r, e	55,000 r, e	55,000 e
Sulfur, byproduct:[e]						
Metallurgy		260,000	325,000	325,000	325,000	300,000
Natural gas and petroleum		1,600,000	1,600,000	1,650,000	1,700,000	1,700,000
Total		1,860,000	1,930,000	1,980,000	2,030,000	2,000,000
MINERAL FUELS AND RELATED MATERIALS						
Coal		73,731,000	84,906,500	86,875,100	86,385,000	96,320,800
Natural gas	thousand cubic meters	13,100,000	14,700,000	14,400,000	14,494,000	14,440,000
Petroleum:						
Crude oil and gas condensate:						
In gravimetric units		47,271,000 r	51,451,000 r	59,485,000 r	61,500,000	64,860,000
In volumetric units[e]	42-gallon barrels	347,000,000 r	378,000,000 r	437,000,000 r	451,000,000 r	476,000,000
Refinery products		NA	8,750,000 e	9,390,000	11,170,000	11,664,000
Uranium:						
U content		2,374 r	2,798 r	3,154 r	3,695 r	4,476
U_3O_8 content		2,800 r	3,300 r	3,719 r	4,357 r	5,279

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. NA Not available. -- Zero.
[1]Table includes data available through November 2007.
[2]Reported figure.

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TABLE 10
KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Alumina	Pavlodar aluminum plant [Eurasian Natural Resources Corp. (ENRC)]	Pavlodar	1,250,000
Arsenic trioxide	Chimkent polymetallic enterprise and other nonferrous metallurgical enterprises	Shymkent	3,500
Asbestos	Facilities:	Locations:	1,000,000 [3]
	Dzhetygara complex	Qostanay	
	Chilisay complex	Aqtobe phosphorite basin	
Barite	Facilities:	Locations:	300,000 [3]
	Karagaylinskiy and Zhayrem mining and beneficiation complexes	Karagayly, Zhayrem deposit	
	Tujuk Mine	Almaty	
	Achisay polymetallic complex	Kentau Region	
Bauxite	Turgay and Krasnooktyabrsky bauxite mining complexes	Central Kazakhstan	5,000,000
Beryllium, metal	Ulba metallurgical plant (Kazatomprom)	Oskemen	NA
Bismuth, metal	Facilities:	Locations:	70 [3]
	Ust-Kamenogorsk lead-zinc metallurgical plant (Kazzinc JSC)	Oskemen	
	Ridder lead smelter (Kazzinc JSC)	Ridder	
Do.	Chimkent refinery	Shymkent	20
Cadmium	do.	do.	10
Do.	Ridder mining-beneficiation complex (Kazzinc JSC)	East Kazakhstan Region	1,200
Chromite, mine output, Cr_2O_3 content (50%)	Donskoy GOK mining-beneficiation complex [Kazchrome, a subsidiary of Eurasian Natural Resources Corp. (ENRC)]	Near Khromtau, Kempirsai Region	5,000,000
Coal	Karaganda Basin	Central and north-central parts of the country	50,000,000
Do.	Ekibastuz Basin	do.	95,000,000
Do.	Maykuben Basin	do.	10,000,000
Do.	Turgay Basin	do.	1,000,000
Copper:			
Mining, recoverable, Cu content	Kazakhmys PLC mines:		
	Balkhash complex:		
	Kounrad Mine	South-central Kazakhstan	11,800
Do.	Sayak Mine	do.	23,500
Do.	Shatyrkul Mine	do.	12,700
Do.	East Region:		
	Artemyevskoe Mine	East Kazakhstan	7,820
Do.	Belousovskoe Mine	do.	2,700
Do.	Irtyshskoe Mine	do.	5,750
Do.	Nikolaevskoe Mine	do.	25,700
Do.	Orlovskoe Mine	do.	86,200
Do.	Yubileyno-Snegirikhinskoe Mine	do.	14,200
Do.	Karaganda Region:		
	Abyz Mine	North-central Kazakhstan	5,710
Do.	Nurkazgan Mine	do.	1,190
Do.	Zhezkazgan complex:		
	Annensky Mine	do.	6,630
Do.	East Mine	do.	65,800
Do.	North Mine	do.	32,500
Do.	South Mine	do.	71,600
Do.	Stepnoy Mine	do.	31,700
Do.	West Mine	do.	23,300

See footnotes at end of table.

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TABLE 10—Continued
KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Copper—Continued:			
Mining, recoverable, Cu content—Continued	Kazzinc JSC (Glencore International AG, 99%):		
	Ridder:		
	Ridder-Sokolny Mine	East Kazakhstan	NA
Do.	Shubinsky Mine	do.	2,750
Do.	Tishinsky Mine	do.	15,000
Do.	Zyrianovsk: Maleevsky Mine	do.	62,100
Processing, recoverable, Cu content	Kazakhmys PLC mines or plants:		
	Balkhash complex—Balkhash concentrator	South-central Kazakhstan	39,500
Do.	East Region:		
	Belousovskoe Mine	East Kazakhstan	2,100
Do.	Irtyshskoe Mine	do.	3,890
Do.	Nikolaevskoe Mine	do.	21,200
Do.	Orlovskoe Mine	do.	77,800
Do.	Karaganda Region: Abyz Mine	North-central Kazakhstan	4,000
	Zhezkazgan complex:		
Do.	Stepnoy Mine	do.	58,200
	Zhezkazgan concentrator:		
Do.	Number 1	do.	88,800
Do.	Number 2	do.	111,000
	Kazzinc JSC:		
Do.	Ridder—Ridder concentrator	East Kazakhstan	NA
Do.	Zyrianovsk—Zyrianovsk concentrator	do.	1,200
Metal	Kazakhmys PLC mines or plants:		
	Balkhash complex:		
	Balkhash smelter	Southc-entral Kazakhstan	250,000
Do.	Balkhash refinery	do.	250,000
Do.	Zhezkazgan complex:		
	Zhezkazgan smelter	North-central Kazakhstan	215,000
Do.	Zhezkazgan refinery	do.	250,000
Do.	Kazzinc JSC—Ust-Kamenogorsk lead smelter	Oskemen	8,400
Ferroalloys:			
Ferrochrome:			
High-carbon 60%	Aqtobe (Aktyubinsk) plant [Kazchrome, a subsidiary of Eurasian Natural Resources Corp. (ENRC)]	Aqtobe	200,000
Medium-carbon 60%	do.	do.	200,000
Do.	Aksu plant [Kazchrome, a subsidiary of Eurasian Natural Resources Corp. (ENRC)]	Aksu	200,000
Ferrosilicon	do.	do.	700,000
Ferrosilicochrome	do.	do.	700,000
Ferrochrome, high-carbon	do.	do.	500,000
Silicomanganese	do.	do.	90,000
Gallium	Pavlodar aluminum plant [Eurasian Natural Resources Corp. (ENRC)]	Pavlodar	NA
Gold	Byproduct of polymetallic ores and native gold mining	NA	30
Iron and steel:			
Pig iron	Ispat-Karmet Steelworks	Karaganda	5,000,000
Steel, crude	do.	do.	6,300,000
Iron ore, marketable	Lisakovskiy and Sokolovsko-Sarbay mining and metallurgical complexes [Sokolovsku-Surbaymining and production union (SSGPO)	Qostanay	25,000,000

See footnotes at end of table.

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TABLE 10—Continued
KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1, 2]

(Metric tons unless otherwise specified)

Commodity		Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Lead:				
Mining, recoverable Pb content of ore		Kazzinc JSC:		
		Ridder:		
		Shubinsky Mine	East Kazakhstan	461
Do.		Tishinsky Mine	do.	15,000
Do.		Zyrianovsk:		
		Grekhovsky Mine	NA	240,000
Do.		Maleevsky Mine	NA	35,100
Mining, gross weight Pb-Zn ore		ShalkiyaZinc N.V.	Kyzylorda region	3,000,000
Processing, recoverable Pb content of ore		Kazzinc JSC—Ridder concentrator	East Kazakhstan	NA
Do.		ShalkiyaZinc N.V. processing plant	Kentau	NA
Metal		Chimkent smelter	Shymkent	60,000
Do.		Kazzinc JSC—Ust-Kamenogorsk lead smelter	Oskemen	168,000
Magnesium, metal		Ust-Kamenogorsk titanium-magnesium plant	do.	23,000
Manganese, crude ore		Facilities:	Locations:	2,550,000 [3]
		Atasurda	Atasu	
		Kazakmarganets [Kazchrome, a subsidiary of Eurasian Natural Resources Corp. (ENRC)]	Tur, East Kamys mines (Karaganda Region)	
		Sary-Arkapolimetal	Zhayrang Region	
		Zhezdy processing plant (Kazchrome, a subsidiary of Eurasian Natural Resources Corp. (ENRC)]	Zhezdy	
Molybdenum:		Facilities:	Locations:	6,000 [3]
Mining, recoverable content of ore		Balkhash complex	Kounrad Mine	
		Karaobinskoye deposit	Karaoba Region	
		Sayak deposit	Sayaq (Sayak) Region	
Metal		Akchatau molybdenum metal plant	Zhezkazgan Region	NA
Natural gas	million cubic meters	Companies:	Locations:	16,000 [3]
		CNPC Aktobemunaigas	Aqtobe	
		Embamunaigaz	Emba District	
		Huricane Kumkol Munai	Aral Sea Region	
		Karachaganak Petroleum Operating BV	Northwestern Kazakhstan	
		Mangistaumunaigaz	Mangghhyshlaq Peninsula	
		Tengizchevroil joint venture	Tengiz deposit	
			Zhanazhol deposit	
			Urikhtau deposit	
		Agip Kazakhstan North Caspian Operating Company (AGip KCO)	Kashagan offshore field	
		Uzenmunaigas	Uzen deposit	
Petroleum:		Companies:	Locations:	32,000,000 [3]
Crude		CNPC Aktobemunaigaz	Aqtobe	
		Embamunaigaz	Emba District	
		Huricane Kumkol Munai	Aral Sea Region	
		Karachaganak Petroleum Operating BV	Karachaganak field	
		Mangistaumunaigaz	Mangghhyshlaq Peninsula	
		Uzenmunaigaz	Uzen deposit	
Do.		Alibekmola, Ayrankul, Chinarevskoye, Kozhasay, North Buzachi, Sazankurak, Saztyube, and Urikhtau deposits	NA	NA
Do.	24-gallon barrels per day	Tengizchevroil joint venture	Tengiz deposit	750,000
Do.	do.	Agip Kazakhstan North Caspian Operating Company (AGip KCO)	Kashagan offshore field	100,000
Refined, crude oil throughput	do.	Atyrau Pavlodar, Shymkent refineries	Atyrau, Pavlodar, Shymkent	427,000 [3]

See footnotes at end of table.

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TABLE 10—Continued
KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Phosphate rock	Companies:	Locations:	10,000,000 [3]
	Chilisay mining directorate	Aqtobe phosphorite basin	
	Karatau production association	Shymkent and Zhambyl Regions	
Rare metals (columbium, indium, selenium, tellurium)	Aktau complex	Aktau	NA
Do.	Belogorsky rare metals plant	Belogorskiy	NA
Do.	Shymkent polymetallic plant	Shymkent	NA
Do.	Ust-Kamenogorsk lead-zinc plant	Oskemen	NA
Do.	Akchatau mining-beneficiation complex	Zhezkazgan Region	NA
Rhenium	Balkhash copper mining-metallurgical complex	do.	NA
Silver, refined	Facilities:	Locations:	1,000 [3]
	Chimkent metallurgical plants	Shymkent	
	Ridder	Ridder	
	Ust-Kamenogorsk	Zhezkazgan Region	
Tantalum	Ulba metallurgical plant (Kazatomprom)	Oskemen	NA
Tin	Akchatau mining-beneficiation complex	Akzhaik deposit, Zhezkazgan Region	700
Titanium:			
Ore, ilmenite	Obukhovskoye, Satpayevskoye, and Shokoshskoye deposits	NA	30,000
Metal	Ust-Kamenogorsk titanium-magnesium complex (UKTMK)	Oskemen	35,000
Uranium, U content	Kazatomprom facilities:	Locations:	5,000 [3]
	Prikaspiskiy ore enrichment center	Aqtau	
	Shevchenko	do.	
	Stepnogorsk	Stepnogorsk	
	Taboshara	Taboshara	
	Tselinny chemical complex	Stepnogorsk	
Zinc:			
Mining, recoverable, Zn content	Kazakhmys PLC mines:		
	East Region:		
	Artemyevskoe Mine	East Kazakhstan	30,200
Do.	Belousovskoe Mine	do.	8,420
Do.	Irtyshskoe Mine	do.	14,700
Do.	Nikolaevskoe Mine	do.	48,700
Do.	Orlovskoe Mine	East Kazakhstan	78,200
Do.	Yubileyno-Snegirikhinskoe Mine	do.	16,500
Do.	Karaganda Region: Abyz Mine	North-central Kazakhstan	20,800
Do.	Kazzinc JSC:		
	Ridder:		
	Ridder-Sokolny Mine	East Kazakhstan	NA
Do.	Shubinsky Mine	do.	2,510
Do.	Tishinsky Mine	do.	79,500
Do.	Shaimerden deposit	North Kazakhstan	1,090,000
Do.	Zyrianovsk:		
	Grekhovsky Mine	East Kazakhstan	240,000
Do.	Maleevsky Mine	do.	203,000
Processing, recoverable, Zn content	Kazakhmys PLC mines:		
	East Region:		
	Artemyevskoe Mine	do.	8,580
Do.	Belousovskoe Mine	do.	5,760
Do.	Irtyshskoe Mine	do.	7,610
Do.	Nikolaevskoe Mine	do.	24,200
Do.	Orlovskoe Mine	do.	55,000
Do.	Yubileyno-Snegirikhinskoe Mine	do.	6,190

See footnotes at end of table.

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TABLE 10—Continued
KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Zinc—Continued:			
Processing, recoverable, Zn content—	Kazzinc JSC:		
Continued	Ridder concentrator	East Kazakhstan	NA
Do.	Shaimerden deposit	North Kazakhstan	72,000
Metal	Kazzinc JSC:		
Do.	Ridder zinc refinery	East Kazakhstan	126,000
Do.	Ust-Kamenogorsk zinc refinery	North Kazakhstan	240,000

[e]Estimated; estimated data are rounded to no more than three significant digits. NA Not available.
[1]Table includes data available through November 2007.
[2]Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.
[3]Capacity estimates are totals for all enterprises that produce that commodity.

TABLE 11
KYRGYZSTAN: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006
METALS						
Antimony:						
Mine output, Sb content[e]		150	40	20	10	50
Metal and compounds		1,504	1,500	1,000	500	203
Gold[e]	kilograms	17,000	22,476 [2]	22,000	16,700	10,721 [2]
Mercury:						
Mine output, Hg content[e]		425	370	488	200	250
Metal		537	500	500	250 [e, 3]	250
Molybdenum, mine output, Hg content[e]		250	250	250	250	250
Tin, mine output, Sn content[e]		300	--	--	--	--
INDUSTRIAL MINERALS						
Cement		532,800	757,300 [r]	870,100 [r]	900,000 [r]	1,215,600
Fluorspar, concentrate[e]		2,750	3,973 [2]	4,000	4,000	4,000
Kaolin		237,100	381,100	400,000 [e]	400,000 [e]	400,000 [e]
Lime, dead-burned		9,300	8,700	11,200	9,500	9,500
Rare earths:						
Concentrate, gross weight		NA [r]	NA	NA	NA	NA
Rare earth oxide equivalent:						
Compounds		NA	NA	NA	NA	NA
Metals		100 [e]	NA	NA	NA	NA
Other[e]		2,000	2,000	NA	NA	NA
Salt		770	1,100	1,100 [e]	1,100 [e]	1,100 [e]
MINERAL FUELS AND RELATED MATERIALS						
Coal		497,500	411,300	454,900	340,200 [r]	314,276
Natural gas	million cubic meters	29	27	29	25	19
Petroleum, crude	thousand metric tons	75,500	68,500	73,800	74,400	70,600

[e]Estimated; estimated data are rounded to no more than three significant digits. [r]Revised. NA Not available. -- Zero.
[1]Table includes data available through November 2007.
[2]Reported figure.
[3]Reported data obtained after estimated data were entered stated that mercury metal production was 304 t in 2005. The series will be updated in the 2007 report.

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TABLE 12
KYRGYZSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Antimony:			
Sb content of ore	Kadamzhay and Khaydarkan complexes	Kadamzhayskiy Rayon, Khaydarkan Region	2,400 [3]
Ore	Kadamzhay beneficiation plant	Kadamzhay deposit	200,000
Do.	Terek-Sayskiy beneficiation plant	Terek-Sayskiy deposit	60,000
Metal and compounds	Kadamzhay metallurgical facility	Kadamzhayskiy Rayon	28,000
Cement	Kantskiy cement plant	Kant	1,500,000
Coal	Seven underground mines and five open pits include the following deposits: Almalyk, Dzhergalan, Kara-Kiche-Kok-Yangak, Kyzyl-Kiya, Sulyukta, and Tashkumyr	Southwestern, central, and northeastern parts of the country	2,200,000 [3]
Fluorspar, concentrate	Khaydarkan mining-metallurgical complex	Khaydarkan deposit	5,000
Gold:			
Au content of ore	Makmalzoloto	Makmal deposit	3
Do.	Kumtor Gold Company (Centerra Gold, Inc.)	Kumtor deposit	22
Do. kilograms	Solton-Sary Mine	Naryn	500
Do.	Taldybulak Levoberezhny deposit	NA	NA
Do.	Talas Gold	Jerooy, Talas Region	NA
Au content of ore, open pit	Kyrgyzaltyn-Noroks Mining Company JV	Dzher-Uy deposit	650,000
Au content of ore, underground	do.	do.	350,000
Refined	Kara-Balta refinery	Chuskaya Oblast'	22
Mercury:			
Hg content of ore	Khaydarkan mining-metallurgical complex	Khaydarkan, Chauvi, Chonkoy, and Novoye deposits	700 [3]
Metal	do.	do.	1,000
Molybdenum, for nonmetallurgical uses	Molibden Joint Stock Company	Chuskaya Oblast'	NA
Do.	Kara Balta mining-metallurgical complex	NA	NA
Natural gas million cubic meters	Kyrgyzazmunayzat	Approximately 300 wells; Changyr-Tash, Chigirchik Pereval, Izbaskentskoye, Kara-Agach, Mayluu-Suu, Susahoye, and Togap-Beshkenskoye deposits (major)	100 [3]
Petroleum	do.	do.	150,000
Do.	Kyrgyz Petroleum Company	Dzhalal-Abad Region	NA
Rare earths:			
Concentrates, gross weight	Aktyuzskiy mining directorate	Kutessai II and Aktyuz-Boordu deposits	14,000
Compounds and metals, rare-earth oxide equivalent	Kyrgyz chemical and metallurgical plant	Orlovka	8,000
Silver	Kumyshtag deposit	Talasskaya Oblast'	NA
Do.	Karagoyskoye deposit	Oshskaya Oblast'	NA
Tin	Uchkoshkon deposit	Sary-Dzhas field	NA
Do.	Tyanshanolovo mining-beneficiation complex	do.	NA
Do.	Enil'chek JSC mining enterprise	Atdzhaylau deposit	150
Do.	do.	Trudovoye deposit	350
Tungsten	do.	do.	95,600
Do.	do.	Atdzhaylau deposit	90
Do.	do.	Trudovoye deposit	120
Uranium, processed	Kara-Balta mining-metallurgical complex	Chuskaya Oblast'	1,200

[e]Estimated; estimated data are rounded to no more than three significant digits. NA Not available.
[1]Table includes data available through November 2007.
[2]Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.
[3]Capacity estimates are totals for all enterprises that produce that commodity.

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TABLE 13
MOLDOVA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity	2002	2003	2004	2005	2006
METALS					
Crude steel	514,000	886,000	1,012,600	1,000,000 e	675,400
INDUSTRIAL MINERALS					
Cement	279,000	255,400	439,700	641,000 r	837,000
Gypsum	91,300	116,100	102,500	562,700 r	725,900
Lime	3,300	2,880	1,911	1,900	1,900
Sand and gravel e	700,000 r	1,000,000 r	1,600,000 r	1,900,000 r	2,100,000
MINERAL FUELS AND RELATED MATERIALS					
Natural gas, dry million cubic meters	NA	NA	NA	NA	56 p
Peat e	475,000	475,000	475,000	475,000	475,000

eEstimated; estimated data are rounded to no more than three significant digits. pPreliminary. rRevised. NA Not available.
[1]Table includes data available through November 2007.

TABLE 14
MOLDOVA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity e
Oil and natural gas:			
Oil	Redeco Moldova oil and gas company	Valeni oilfield	100,000
Natural gas thousand cubic meters	do.	Victorovca gasfield	5,000
Steel, crude	Moldova Steel Works minimill	Ribnita, Transnistria Region	1,100,000

eEstimated; estimated data are rounded to no more than three significant digits.
[1]Table includes data available through November 2007.
[2]Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.

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TABLE 15
RUSSIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006
METALS						
Aluminum:						
Ore and concentrate:						
Alumina	thousand metric tons	3,131	3,230	3,269	3,259	3,265
Bauxite		4,586,000	5,442,000	6,000,000 e	6,400,000 e	6,600,000 e
Nepheline concentrate, 25% to 30%		1,022,000	1,014,000	1,000,000 e	1,000,000 e	1,000,000 e
Metal, smelter, primary		3,347,413	3,478,057	3,591,747	3,647,072	3,717,907
Antimony, mine output, recoverable Sb content e		1,000	2,000	3,000	3,000	3,500
Arsenic, white e		1,500	1,500	1,500	1,500	1,500
Bismuth: e						
Mine output, Bi content		50	50	50	50	55
Metal, refined		10	10	10	10	11
Cadmium, metal, smelter e		950	950	950	1,000	1,100
Chromium, chrome ore, marketable		74,300	116,455	320,200	772,000	800,000
Cobalt: e						
Mine output, recoverable Co content		4,600	4,800	4,700	5,000	5,500
Metal, refined		5,100	5,500	5,400	5,800	6,300
Copper:						
Ore, recoverable Cu content e		695,000	675,000	675,000	700,000	725,000
Metal:						
Blister, smelter: e						
Primary		660,000	670,000	662,000	686,000	712,000
Secondary		200,000	170,000	257,000	272,000	290,000
Total		860,000	840,000	919,000 2	958,000	1,000,000
Refined:						
Primary		670,000 e	670,000 e	662,000	664,000	684,000
Secondary		200,000 e	170,000 e	257,000	269,000	284,000
Total		870,000 e	840,000 e	919,000	933,000	968,000
Gallium e		11	10	9	10	11
Gold:						
Mine output, Au content	kilograms	168,411	170,068	163,148	163,186 r	159,340
Secondary recovery	do.	2,493	6,835	4,844	4,884	4,981
Indium e		10	10	11	12	12
Iron and steel:						
Iron ore:						
Gross weight		84,236,400	91,759,800	96,980,000	96,764,400	102,000,000
Fe content, 55% to 63% e		49,000,000 2	53,000,000	56,200,000	56,100,000	59,100,000
Metal:						
Pig iron		46,060,000	48,368,000	50,426,700	49,175,000 r	51,683,000
Direct-reduced iron e		2,910,000 2	2,900,000	3,140,000	3,340,000	3,340,000
Ferroalloys: e						
Blast furnace:						
Ferromanganese		105,000	101,000	108,000	108,000	125,000
Ferrophosphorus		3,500	3,500	3,500	3,500	3,500
Spiegeleisen		7,000	7,000	7,000	7,000	7,000
Electric furnace:						
Ferrochromium		210,000 2	357,000 2	453,700 2	578,000 2	600,000
Ferrochromiumsilicon		4,000	4,000	4,000	4,000	4,000
Ferronickel		45,000	23,547 r, 2	28,654 r, 2	24,050 r, 2	28,200
Ferrosilicon		701,000	760,000	721,000 r	742,000 2	750,000
Ferrovanadium		15,100	8,000	13,700 r	12,880 2	13,000
Silicomanganese		127,000	83,000	143,000	145,000	170,000
Silicon metal		40,000 r	45,000 r	45,000 r	45,000	46,000
Other		14,900	22,000	22,000	22,000	22,000
Total		1,270,000 r	1,410,000 r	1,550,000 r	1,690,000 r	1,770,000

See footnotes at end of table.

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TABLE 15—Continued
RUSSIA: PRODUCTION OF MINERAL COMMODITIES[1, 2]

(Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006
METALS—Continued						
Iron and steel—Continued:						
Metal—Continued:						
Steel:						
Crude		59,776,600	62,707,600	65,645,600	66,186,200	70,766,000
Finished, rolled		48,700,000	51,050,000	53,800,000	54,600,000	58,200,000
Pipe		5,115,200	6,102,000	5,990,000	6,673,000	7,974,000
Lead:[e]						
Mine output, recoverable Pb content		19,000	24,000	23,000	36,000	36,000
Metal, refined, primary and secondary		60,350 [2]	66,000	70,000	66,000	78,000
Magnesium:[e]						
Magnesite		1,000,000	1,200,000	1,200,000	1,100,000 [r]	1,200,000
Metal, including secondary		40,000	43,000	45,000	45,000	50,000
Manganese ore:[e]						
Gross weight		115,000	115,000	115,000	115,000	120,000
Mn content		23,000	23,000	23,000	23,000	24,000
Mercury[e]		50	50	50	50	50
Molybdenum[e]		2,900	2,900	2,900	3,000 [r]	3,100
Nickel:[e]						
Mine output, recoverable Ni content		310,000	300,000	315,000	315,000	320,000
Matte, for export		7,783	3,866	599	700 [r]	1,300
Nickel products:						
Ferronickel, Ni content		12,000	13,500	14,000	13,000	15,500
Metal		239,000	260,000	261,000	266,000	270,000
Oxide sinter		6,000	5,000	5,000	5,000	5,500
Chemicals		2,000	2,500	3,000	3,000	3,500
Total		259,000	281,000	283,000	287,000	295,000
Platinum-group metals:[e]						
Platinum	kilograms	27,000	28,000	28,000	29,000 [r]	29,000
Palladium	do.	96,000	97,000	97,000	97,400	98,400
Other	do.	14,500	15,000	15,000	15,500	15,600
Total	do.	138,000	140,000	140,000	142,000 [r]	143,000
Rhenium[e]	do.	1,400	1,400	1,400	1,400	1,400
Selenium		60	81	85	100	110
Silicon[e]		NA	570,000	550,000	525,000	540,000
Silver[e]						
Mine output, Ag content	kilograms	400,000	700,000	1,276,900 [2]	1,350,000 [2]	1,300,000
Secondary recovery[e]	do.	250	250	265	265	265
Tin:[e]						
Mine output, recoverable Sn content		1,300	2,000	2,500	3,000	3,000
Metal, smelter:						
Primary		4,615 [2]	4,100	4,570	5,000 [r]	4,980
Secondary		500	500	500	500 [r]	500
Total		5,120	4,600	5,070	5,500 [r]	5,480
Titanium sponge[e]		22,000	23,000	26,000 [r]	29,000 [r]	32,000
Tungsten, concentrate, W content[e]		5,300	5,450	5,500	4,400 [r]	4,000
Vanadium, metal[e]		8,000	5,800	10,900	15,100	15,100
Zinc:[e]						
Mine output, recoverable Zn content		130,000 [2]	159,000	179,000	180,000	190,000
Metal, smelter, primary and secondary		244,000	253,000	240,000	220,000	240,000
Zirconium, baddeleyite concentrate, averaging 98% ZrO_2[e]		6,900 [r]	6,600 [r]	5,500 [r]	5,000 [r]	5,000
INDUSTRIAL MINERALS						
Asbestos, grades I-VI[e]		775,000	878,000 [2]	923,000 [2]	925,000	925,000
Barite[e]		59,000	78,000	63,000	63,000	63,000
Boron[e]	thousand metric tons	1,000	1,000	500	400	400
Cement, hydraulic		37,700,000	41,000,000	45,700,000	48,500,000 [r]	54,700,000

See footnotes at end of table.

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TABLE 15—Continued
RUSSIA: PRODUCTION OF MINERAL COMMODITIES[1, 2]

(Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006
INDUSTRIAL MINERALS—Continued						
Clays, kaolin concentrate[e]		45,000 [2]	45,000	45,000	45,000	45,000
Diamond:[e]						
Gem	carats	17,400,000	20,000,000	21,400,000	23,000,000	23,300,000
Industrial	do.	11,600,000	13,000,000	14,200,000	15,000,000	15,100,000
Synthetic	do.	80,000,000	80,000,000	80,000,000	80,000,000	80,000,000
Total	do.	109,000,000	113,000,000	116,000,000	118,000,000	118,400,000
Feldspar[e]		45,000	45,000	45,000	45,000	45,000
Fluorspar, concentrate, 55% to 96.4% CaF_2		169,000	170,000 [e]	226,400	245,500	210,000 [e]
Gypsum[e]		1,600,000	1,750,000	2,077,000 [2]	2,200,000	2,200,000
Iodine[e]		300,000	300,000	300,000	300,000	300,000
Lime, industrial and construction[e]		8,000,000	8,000,000	8,200,000 [2]	8,200,000	8,200,000
Lithium minerals, unspecified[e]		2,000	2,000	2,200	2,200	2,200
Mica[e]		100,000	100,000	100,000	100,000	100,000
Nitrogen, N content of ammonia		8,600,000	9,100,000	9,900,000 [r]	10,300,000 [r]	10,500,000
Phosphate rock:[e]						
Gross weight		10,700,000	11,000,000	11,000,000	11,000,000	11,000,000
P_2O_5 content:						
Apatite concentrate, 37% to 39.6%		4,038,000 [2]	4,121,000 [2]	4,120,000	4,100,000 [r]	4,100,000
Sedimentary rock, 19% to 30%		120,000 [r]	120,000 [r]	120,000 [r]	120,000 [r]	120,000
Total		4,160,000 [r]	4,240,000 [r]	4,240,000 [r]	4,220,000 [r]	4,220,000
Potash, marketable, K_2O equivalent[e]		4,400,000	4,740,000	5,000,000	5,000,000	5,720,000
Salt, all types[e]		2,900,000 [r]	2,700,000 [r]	2,900,000 [r]	2,700,000 [r]	2,900,000
Soda ash[e]		2,400,000	2,400,000	2,600,000	2,600,000	2,800,000
Sulfur:[e]						
Native		50,000	50,000	50,000	50,000	50,000
Pyrites		350,000	350,000	300,000	300,000	300,000
Byproduct:						
Metallurgy		500,000	520,000	570,000	600,000	650,000
Natural gas		5,600,000	5,800,000	6,000,000	6,000,000	6,000,000
Total		6,500,000	6,720,000	6,920,000	6,950,000	7,000,000
Sulfuric acid		8,500,000	8,800,000	9,200,000	9,500,000 [r]	9,300,000
Talc[e]		100,000	100,000	100,000	100,000	100,000
Vermiculite[e]		25,000	25,000	25,000	25,000	25,000
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Anthracite		9,000,000	7,900,000	7,800,000	8,000,000	18,000,000
Bituminous		247,000,000	269,100,000	203,200,000	195,000,000	215,000,000
Lignite		74,200,000	79,400,000	70,400,000	95,300,000 [r]	75,800,000
Total		330,200,000	356,400,000	281,400,000	298,300,000 [r]	308,800,000
Coke, 6% moisture content		30,900,000	32,700,000	33,801,000	31,600,000	32,700,000
Natural gas, marketed	million cubic meters	595,000	616,450	633,950	635,964	656,230
Oil shale		1,100,000	1,240,000	1,230,000	1,200,000 [r]	1,200,000
Peat, fuel use		-- [r]	1,000,000	1,500,000	1,600,000 [r]	1,300,000
Petroleum:						
Crude in:						
Gravimetric units		379,000,000	412,377,000	458,808,000	469,600,000	480,480,000
Volumetric units[e]	thousand 42-gallon barrels	2,790,000	3,000,000	3,300,000	3,500,000	3,530,000
Refinery products[3]		184,960,000	190,030,000	195,000,000	207,000,000	219,575,000
Uranium:						
U content[e]		2,900	3,150	3,200	3,430	3,190
U_3O_8 content		3,420	3,715	3,774	4,045	3,762

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. NA Not available. -- Zero.

[1]Table includes data available through November 2007.

[2]Reported figure.

[3]Not distributed by type and therefore not suitable for conversion to volumetric units. Data include all energy and nonenergy products but exclude losses.

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TABLE 16
RUSSIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1, 2]

(Metric tons unless otherwise specified)

Commodity		Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Alumina		Achinsk (RUSAL)	Achinsk in East Siberia	900,000
Do.		Bogoslovsk (SUAL Group)	Krasnotur'insk	1,050,000
Do.		Boksitogorsk (RUSAL)	European north	200,000
Do.		Pikalyovo (SUAL Group)	Pikalyovo	300,000
Do.		Uralsk (SUAL Group)	Kamensk-Uralskiy	700,000
Aluminum, primary smelters		Bogoslovsk (SUAL Group)	Krasnotur'insk	175,000
Do.		Bratsk (RUSAL)	Bratsk	950,000
Do.		Irkutsk (SUAL Group)	Irkutskaya Oblast'	300,000
Do.		Kandalaksha (SUAL Group)	Kola Pennisula	75,000
Do.		Khakaz (RUSAL)	Khakassiya	300,000
Do.		Krasnoyarsk (RUSAL)	Krasnoyarskiy Kray	875,000
Do.		Nadvoitsy (SUAL Group)	Nadvoitsy in Karelia	75,000
Do.		Novokuznetsk (RUSAL)	Novokuznetsk	300,000
Do.		Sayansk (RUSAL)	Sayanogorsk	425,000
Do.		Uralsk (SUAL Group)	Kamensk-Uralskiy	150,000
Do.		Volgograd (SUAL Group)	Volgogradskaya Oblast'	175,000
Do.		Volkhov (SUAL Group)	Volkhov, east of St. Petersburg	20,000
Amber		Kaliningrad Amber enterprise (Kaliningrad regional authorities and Alrosa)	Kaliningrad Region	250
Antimony:				
Sb content of concentrate		Sarylakh deposit	Ust'-Nera Region, Sakha (Yakutiya) Republic	6,000 [3]
Do.		Sentachan deposit	Northeastern Sakha (Yakutiya) Republic	NA
Compounds and metals		Ryazsvetmet plant	Ryazanskaya Oblast'	NA
Apatite, concentrate		Khibiny apatite association (OAO Apatit)	Kola Peninsula	15,000,000
Do.		Kovdor iron ore mining association	do.	700,000
Asbestos		Kiyembay	Orenburgskaya Oblast'	500,000
Do.		Tuvaasbest	Tuva Autonomous Region	250,000
Do.		Uralaasbest	Central Ural Mountains	1,100,000
Barite		Salarinskiy mining and beneficiation complex	Kvartsitovaya Sopka deposit	100,000
Bauxite		North-Urals mining company (SUAL Group)	Severoural'sk Region	NA
Do.		South-Urals mining company (SUAL Group)	South Ural Mountains	NA
Do.		Severnaya Onega Mine (RUSAL)	Northwest Region	800,000
Do.		Komi Aluminum (SUAL Group)	Sredne-Timan	3,000,000
Boron, boric acid		Bor Association	Maritime Territory	140,000
Do.		Amur River complex	Far East	8,000
Do.		Alga River chemical complex	do.	12,000
Chromite		Saranov complex	Saranovskiy	200,000
Coal		Donets (east) Basin	Rostovskaya Oblast'	30,000,000
Do.		Kansk Achinsk Basin	East Siberia	50,000,000
Do.	thousand metric tons	Kuznetsk Basin (Kuzbas)	West Siberia	160,000
Do.		Moscow Basin	Moscow Region	15,000,000
Do.		Neryungri Basin	Sakha (Yakutiya) Republic	15,000,000
Do.		Pechora Basin	Komi Republic	30,000,000
Do.		South Yakutiya Basin	Sakha (Yakutiya) Republic	17,000,000
Cobalt:		MMC Noril'sk Nickel	Noril'sk, Kola Peninsula	4,000
Do.		Rezh and Yuzhuralnikel enterprises	South Ural Mountains	2,100
Do.		Ufaleynikel company	Chelyabinsk region, Ural Mountains	4,000
Do.		Tuva cobalt	Khovu-Aksy, Tuva Autonomous Region	NA
Copper:				
Cu in ore		MMC Noril'sk Nickel	Noril'sk region, Kola Peninsula	500,000
Do.		Russian Copper Company (RCC)	Ural Mountains	70,000
Do.		Urals Mining and Metallurgical Company (UMMC)	do.	230,000

See footnotes at end of table.

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TABLE 16—Continued
RUSSIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1, 2]

(Metric tons unless otherwise specified)

Commodity		Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Copper—Continued:				
Metal, refined		MMC Noril'sk Nickel	Noril'sk region, Kola Peninsula	450,000
Do.		Russian Copper Company (RCC)	Ural Mountains	170,000
Do.		Ural Mining and Metallurgical Company (UMMC)	do.	360,000
Diamond, gem and industrial	thousand carats	Almazy Rossii-Sakha Association (Alrosa) enterprises:	Sakha (Yukutiya) Republic mines:	
		Udachnyy mining and beneficiation complex	Zarnitsa and Udachnyy	NA
Do.	do.	Mirny mining and beneficiation complex	Mir and International	NA
Do.	do.	Aikhal mining and beneficiation complex	Aikhal and Komsomol'skiy	NA
Do.	do.	Anabaraskiy mining and beneficiation complex	Alluvial mines	NA
Do.	do.	Nyurbinskiy mining and beneficiation complex	Nyurbinskiy and Botuobinskiy	NA
Do.	do.	Lomonosov	Arkhangel'skaya Oblast'	NA
Feldspar		Kheto-Lanbino and Lupikko deposits	Karelia	NA
Ferroalloys		Kosaya Gora iron works	Kosaya,Gora	200,000
Do.		Kuznetsk ferroalloys plant	Novokuznetsk	400,000
Do.		Lipetsk iron and steel works	Lipetskaya Oblast'	NA
Do.		Serov ferroalloy plant	Serov	NA
Do.		Chelyabinsk electrometallurgical plant	Chelyabinskaya Oblast'	450,000
Do.		Chusovoy iron and steel plant	Chusovoy	NA
Do.		Klyuchevsk ferroalloy plant	Dvurechensk	160,000
Ferronickel		Ufaleynikel company	Chelyabinsk Region, Urals	5,000
Ferrovanadium		Vanadii-Tulachermet	Tula, North Caucasus	NA
Fluorspar		Abagaytuy deposit	Transbaikal	NA
Do.		Usugli mine	do.	NA
Do.		Kyakhtinsky deposit	do.	NA
Do.		Kalanguy mining complex	Chita Region, Transbaikal	NA
Do.		Yaroslavsky mining-beneficiation complex	Pogranichnoye and Vosnesenskoye deposits, Russian Far East's Maritime (Primor'ye) Region	NA
Gold	kilograms	Mining companies:	Mining regions:	
		Amur a/s ZAO	Khabarovsk Kray	5,500
Do.	do.	Buryatzoloto OAO	Buryat Republic	5,000
Do.	do.	Chukotka a/s	Chukotsk Autonomous Oblast'	1,700
Do.	do.	GRK Aldanzoloto OOO	Sakha (Yukutiya) Republic	4,000
Do.	do.	LT-Resurs, ZAO	Irkutsk Oblast'	2,700
Do.	do.	Neryungri-Metallik, OOO	Sakha (Yukutiya) Republic	1,500
Do.	do.	Nirungan, OOO	do.	1,100
Do.	do.	Omchak OAO	Magadan Oblast'	3,000
Do.	do.	Omolonskaya ZRK, OAO	do.	5,000
Do.	do.	Omsukchanskaya GGK, ZAO	do.	3,000
Do.	do.	Oyna, a/s	Tyva Republic	1,500
Do.	do.	Pokrovskiy mine OAO	Amur Oblast'	6,000
Do.	do.	Polimetal, MNPO, OAO	Magadan and Sverdlovsk Oblast's, Khabarovsk Kray	7,500
Do.	do.	Polyarnaya, a/s	Chukotsk Autonomous Oblast'	1,000
Do.	do.	Polyus ZAO	Krasnoyarsk Kray	38,000
Do.	do.	Priisk Drazhnyy, OOO	do.	1,200
Do.	do.	Priisk Solov'yevskiy, OAO	Amur Oblast'	1,500
Do.	do.	Ros-DV, OOO	Khabarovsk Kray	1,100
Do.	do.	Russdragmet OOO	Khabarovsk Kray, Chita Oblast'	6,000
Do.	do.	Seligdar, a/s	Sakha (Yukutiya) Republic	2,000
Do.	do.	Sovrudnik, OOO	Krasnoyarsk Kray	2,000
Do.	do.	Susumanzoloto, OAO	Magadan Oblast'	3,000
Do.	do.	Uralelktomed', OAO	Sverdlovsk Oblast'	1,400
Do.	do.	Vitim, a/s	Irkutsk Oblast'	2,900

See footnotes at end of table.

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TABLE 16—Continued
RUSSIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1, 2]

(Metric tons unless otherwise specified)

Commodity		Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Gold—Continued	kilograms	Mining companies:	Mining regions:	
		Votok, a/s	Khabarovsk Kray	1,100
Do.	do.	Yuzhuralzoloto	Chelyabinsk Oblast'	4,200
Do.	do.	Zapadnaya, a/s	Krasnoyarsk Kray	1,900
Do.	do.	Zolotaya, ZDK, ZAO	Khakasiya Republic	1,200
Iron ore		Kursk Magnetic Anomaly (KMA) region, which contains the following enterprises:		50,000,000 [3]
		Lebedi and Stoilo	Gubkin	
		Mikhaylovka	Zheleznogorsk	
Do.		Northwest region, which contains the following enterprises:		22,000,000 [3]
		Kostomuksha	Kostomuksha	
		Kovdor	Kola Peninsula	
		Olenegorsk	Olenegorsk	
Do.		Siberia region, which contains the following enterprises:		18,000,000 [3]
		East:		
		Korshunovo	Zheleznogorsk	
		Rudnogorsk	Rudnogorsk	
		West:		
		Abakan	Abaza	
		Sheregesh	Sheregesh	
		Tashtagol	Tashtagol	
		Teya	Vershina Tei	
Do.		Ural Mountains region, which contains the following enterprises:		22,000,000 [3]
		Akkermanovka	Novotroitsk	
		Bakal	Bakal	
		Goroblagodat	Kushva	
		Kachkanar	Kachkanar	
		Magnitogorsk	Magnitogorsk	
		Peshchanka	Rudnichnyy	
Lead, metal		Dalpolymetal lead smelter	Rudnaya in the Maritime District	20,000
Do.		Elektrozinc lead smelter [Urals Mining and Metallurgical Company (UMMC)]	Vladikavkaz in North Caucasus	40,000
Lead-zinc, recoverable content of ore:				
Lead, recoverable Pb content of ore		Altay mining-beneficiation complex	Altay Mountains region, South Siberia	2,000
Do.		Dalpolymetal mining-beneficiation complex	Maritime Territory	20,000
Do.		Nerchinsk polymetallic complex	Chitinskaya Oblast'	7,000
Do.		Sadon lead-zinc complex	Severnaya Osetiya-Alaniya Republic	5,000
Do.		Salair mining-beneficiation complex	Kemerovo Oblast'	2,000
Zinc, recoverable Zn content of ore		Altay mining-beneficiation complex	Altay Mountains region, South Siberia	1,000
Do.		Dalpolymetal mining-beneficiation complex	Maritime Territory	25,000
Do.		Nerchinsk polymetallic complex	Chitinskaya Oblast'	12,500
Do.		Sadon lead-zinc complex	Severnaya Osetiya-Alaniya Republic	14,000
Do.		Salair mining-beneficiation complex	Kemerovo Oblast'	10,500
Magnesite		Karagayskiy open pit (Magnezit Group) and Magnezitovaya underground mine (Magnezit Group)	Sakha group of deposits (Chelyabinsk Oblast')	3,800,000 [3]
Magnesium, metal (for sale)		Avisma plant	Berezniki	35,000
Do.		Solikamsk plant (Uralkaliy)	Solikamsk	30,000
Mica		Aldan	Sakha (Yakutiya) Republic	NA
Do.		Karel	Karelia	NA
Do.		Kovdor	Kola Peninsula	NA
Do.		Mam	Irkutsk complex	NA

See footnotes at end of table.

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TABLE 16—Continued
RUSSIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1, 2]

(Metric tons unless otherwise specified)

Commodity		Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Molybdenum		Dzhida tungsten-molybdenum mine	West Transbaikal	NA
Do.		Sorsk molybdenum mining enterprise	Sorsk Region	NA
Do.		Tyrnyauz tungsten-molybdenum mine	North Caucasus	NA
Do.		Shakhtaminskoye molybdenum mining enterprise	Chitinskaya Oblast'	NA
Natural gas	million cubic meters	Komi Republic	Komi Republic	8,000
Do.	do.	Noril'sk area	Noril'sk area	5,500
Do.	do.	North Caucasus	North Caucasus	6,000
Do.	do.	Sakhalin	Far East	2,000
Do.	do.	Tomsk Oblast	West Siberia	500
Do.	do.	Tyumen Oblast, of which:	do.	575,000 [3]
Do.	do.	Medvezhye field	do.	(75,000)
Do.	do.	Urengoy field	do.	(300,000)
Do.	do.	Vyrngapur field	do.	(17,000)
Do.	do.	Yamburg field	do.	(170,000)
Do.	do.	Bovanenko field	Yamal Peninsula	NA
Do.	do.	Pestsovoyy field	Ob-Taz Gulf area	NA
Do.	do.	Zapolyarnyy field	do.	NA
Do.	do.	Schtokmanov field	Barents Sea	NA
Do.	do.	Urals	Ural'skiye Gory	45,000
Do.	do.	Volga	Volga Region	6,000
Do.	do.	Yakut-Sakha	Sakha (Yakutiya) Republic	1,500
Nepheline syenite		Apatite complex	Kola Penisula	1,500,000
Do.		Kiya-Shaltyr Mine	Goryachegorsk Region, east Siberia	NA
Nickel:				
Ni in ore		MMC Noril'sk Nickel	Noril'sk Region, Kola Peninsula	300,000
Do.		Yuzhuralnikel company	South Ural Mountains	3,000
Do.		Ufaleynikel company	Chelyabinsk Region, Ural Mountains	17,000
Metal:				
Smelting		MMC Norilsk Nickel	Noril'sk region	160,000
Do.		do.	Pechenga	50,000
Do.		do.	Monchegorsk	50,000
Refining		do.	Noril'sk region	100,000
Do.		do.	Monchegorsk	140,000
Ni products and Ni in FeNi		Rezh, Ufaleynikel, and Yuzhuralnikel enterprises	South Ural Mountains	65,000
Niobium (columbium)		Karnarsurt mining enterprise (AO Sevredmet)	Lovozerskoye deposit, Kola Peninsula	12,000
Oil shale		Leningradslanets Association	Slantsy Region	5,000,000
Petroleum		East Siberia, Tomsk Oblast	Tomskaya Oblast'	11,000,000
Do.		European Russia:		
		Astrakhan	North Caspian Sea basin	700,000
Do.		Bashkortostan	Ural'skiye Gory	28,000,000
Do.		Checheno-Ingush Republic	South Caucasus	4,500,000
Do.		Dagestan	North Caucasus	700,000
Do.		Kaliningrad Oblast	Baltic coast	1,800,000
Do.		Komi Republic	Northwest	15,000,000
Do.		Krasnodar Kray	North Caucasus	2,000,000
Do.		Orenburg Oblast	Ural'skiye Gory	13,000,000
Do.		Perm Oblast	do.	12,000,000
Do.		Samara	Volga Region	16,000,000
Do.		Saratov Oblast	do.	1,500,000
Do.		Stavropol Kray	North Caucasus	2,000,000
Do.		Tatarstan	Volga Region	40,000,000
Do.		Udmurt Republic	Ural'skiye Gory	9,000,000

See footnotes at end of table.

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TABLE 16—Continued
RUSSIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1, 2]

(Metric tons unless otherwise specified)

Commodity		Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Petroleum—Continued	thousand metric tons	Fields, of which:	Tyumenskaya Oblast', West Siberia	300,000 [4]
Do.		Kogolym	do.	(34,000)
Do.	do.	Krasnoleninskiy	do.	(12,000)
Do.	do.	Langepas	do.	(30,000)
Do.	do.	Megion	do.	(18,000)
Do.	do.	Nizhnevartovsk	do.	(70,000)
Do.	do.	Noyabrsk	do.	(37,000)
Do.	do.	Purneftegaz	do.	(12,000)
Do.	do.	Surgat	do.	(48,000)
Do.	do.	Uray	do.	(8,000)
Do.	do.	Varegan	do.	(10,000)
Do.		Sakhalin Island	Sakhalin Island	2,500,000
Phosphate rock		Kingisepp complex (OAO fosforit)	Leningradskaya Oblast'	3,500,000
Do.		Lopatino and Yegorevsk deposits	Moscow Oblast'	NA
Do.		Polpinskoye deposit	Bryanskaya Oblast'	NA
Do.		Verkhnekamsk deposit	Ural'skiye Gory	NA
Phosphate rock, apatite concentrate		OAO Apatit	Kola Peninsula	12,000,000
Do.		Kovdor iron mining complex	do.	700,000
Platinum-group metals:				
Ore, PGM content		MMC Noril'sk Nickel	Noril'sk region	150
Do.		AO Koryakgeoldobycha, Amur Prospectors	Placer deposits (mostly platinum), Ural Mountains; Siberia; Russian Far East	10 [3]
Metals		Krasnoyarsk Nonferrous Metals Plant (Krastsvetmet)	Krasnoyarskiy Kray	NA
Do.		Ekaterinburgskiy plant (EZOTsM)	Ekaterinburg	NA
Do.		Priobsk plant	Priobsk	NA
Potash, K_2O equivalent		Uralkaliy	Verkhnekamsk deposit	3,000,000
Do.		Silvinit (Joint-Stock Co.)	Solikamsk-Berezniki regions, Ural'skiye Gory	2,000,000
Rare earths		Lovozerskoye deposit	Kola Peninsula	NA
Salt		AO Bassol'	Lake Baskunchak in Astrakhan Region	2,500,000
Silver		Dukat Mine	Magadanskaya Oblast'	1,000
Soda ash		Achinsk plant	East Siberia	595
Do.		Berezniki plant	Ural'skiye Gory	1,080
Do.		Pikalevo plant	Leningradskaya Oblast'	200
Do.		Sterlitamak plant	Sterlitamak	2,135
Do.		Volkhov plant	Leningradskaya Oblast'	20
Steel, crude		Amurstal	Komsomol'sk-na-Amure	1,600,000
Do.		Asha	Asha	450,000
Do.		Beloretsk	Bashkirskoye	380,000
Do.		Chusovoy	Chusovoy	570,000
Do.		Elektrostal	Moscow	314,000
Do.		Gorky	Nizhniy Novgorod	78,000
Do.		Gur'yevsk	Gur'yevsk	160,000
Do.		Karaganda	Karaganda	6,300,000
Do.		Kuznetsk	Novokuznetsk	4,700,000
Do.		Lys'va	Lys'va	350,000
Do.		Magnitogorsk	Magnitogorsk	16,200,000
Do.		Mechel (Chelyabinsk)	Chelyabinskaya Oblast'	7,000,000
Do.		Nizhniy Tagil	Nizhniy Tagil	8,000,000
Do.		Nizhniy Sergi	Nizhniye Sergi	300,000
Do.		Nosta (Orsk-Kahlilovo)	Novotroitsk in Orenburgskaya Oblast'	4,600,000
Do.		Novolipetsk	Lipetskaya Oblast'	9,900,000
Do.		Novosibirsk	Novosibirskaya Oblast'	1,100,000

See footnotes at end of table.

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TABLE 16—Continued
RUSSIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Steel, crude—Continued	Omutninsk	Omutninsk	210,000
Do.	Oskol Electric Steel	Staryy Oskol	2,500,000
Do.	Petrovsk-Zabaykal'skiy	Petrovsk-Zabaykal'skiy	426,000
Do.	Revda	Revda	281,000
Do.	Salda	Sverdlovskaya Oblast'	1,900
Do.	Serov A.K.	Serov	1,000,000
Do.	Serp i Molot	Moscow	70,000
Do.	Severskiy	Polevskoy in Sverdlovskaya Oblast'	825,000
Do.	Severstal (Cherepovets)	Cherepovets	14,000,000
Do.	Sibelektrostal	Krasnoyarsk Kray	110,000
Do.	Sulin	Sulin	280,000
Do.	Taganrog	Taganrog	925,000
Do.	Tulachermet Scientific and Industrial Association	Tula	18,400
Do.	Verkh-Isetskiy	Ekatrinenburg	132,000
Do.	Volgograd	Volgogradskaya Oblast'	2,000,000
Do.	Vyksa	Vyksa	540,000
Do.	West Siberian	Novokuznetsk	6,900,000
Do.	Zlatoust	Zlatoust in Chelyabinskaya Oblast'	1,200,000
Talc	Onotsk deposit	Irkutskaya Oblast'	NA
Do.	Kirgiteysk deposit	Krasnoyarsk Kray	NA
Do.	Miass deposit	Chelyabinskaya Oblast'	NA
Do.	Shabrovsk deposit	Sverdlovskaya Oblast'	NA
Tantalum, ore	Lovozerskoye deposit	Kola Peninsula	10[3]
	Zabaykalskiy mining and beneficiation complex	Etykinskoye deposit	
Tin:	Novosibirsk mining-beneficiation complexes:		
Ore	Khinganskoye olovo (Jewish Autonomous District)	Khabarovskiy Kray	NA
Do.	Dalolovo	Solnechnyy deposit, Primor'ye	NA
Do.	Deputatskiy (Sakhaolovo)	Sakha (Yakutiya) Republic	NA
Do.	Vostokolovo	Russian Far East	NA
Do.	Iultin mining-beneficiation complex	Magadanskaya Oblast'	NA
Do.	Khrustalnyy mining-beneficiation complex	Maritime Territory	NA
Do.	Pevek mining-beneficiation complex	Magadanskaya Oblast'	NA
Metal	Novosibirsk smelter	Novosibirskaya Oblast'	NA
Do.	Podol'sk smelter	Podol'sk	NA
Do.	Ryazan smelter	Ryazanskaya Oblast'	NA
Titanium:			
Sponge	VSMPO-Avisma titanium-magnesium complex	Sverdlovskaya Oblast', Ural Mountains	40,000
Metal	Moscow plant	Moscow	NA
Do.	Podol'sk plant	Podol'sk	NA
Do.	VSMPO-Avisma titanium-magnesium complex	Sverdlovskaya Oblast', Ural Mountains	NA
Tungsten:			
W content of concentrates	Antonovogorsk	East Transbaikal	NA
Do.	Balkan	Northeast of Magnitogorsk, Ural'skiye Gory	NA
Do.	Belukha	East Transbaikal	NA
Do.	Bom-Grokhom	West Transbaikal	NA
Do.	Dzhida	do.	NA
Do.	Iultin	Magadanskaya Oblast'	NA
Do.	Lermontov	Russian Far East	NA
Do.	Solnechnyy	Southern Khabarovskiy Kray	NA
Do.	Tyrnyauz tungsten-molybdenum mining and processing complex	Kabardino-Balkariya, North Caucasus	NA

See footnotes at end of table.

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TABLE 16—Continued
RUSSIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Tungsten—Continued:			
W content of concentrates—Continued	Primorsky	Russian Far East	NA
Do.	Aginskoye deposit	Sakha (Yakutiya) Republic	NA
Do.	Kti-Teberdaskoye deposit	North Caucasus	NA
Metal, tungsten anhydride	Gidrometallurg plant	Nal'chik, North Caucasus	NA
Uranium, U content	Facilities:	Locations:	3,500 [3]
	ZAO Dalur mining enterprise (TVEL Corp.)	Kurgan Region	
	OAO Khiagda mining enterprise (TVEL Corp.)	Buryatiya	
	Priargunsky mining and chemical union (TVEL Corp.)	Krasnokamensk, Chita Region	
Vanadium:			
Ore	Kachkanar iron mining complex	Ural'skiye Gory	NA
Metal	Chusovoy and Nizhniy Tagil plants	do.	17,000
Pentoxide	Vanadii-Tulachermet	Tula, North Caucasus	NA
Zinc:			
Zn content of ore	Bashkir copper-zinc complex	Sibai, southern Ural Mountains	5,000
Do.	Buribai copper-zinc mining complex	Buribai, southern Ural Mountains	1,500
Do.	Gai copper-zinc mining-beneficiation complex	Gai, southern Ural Mountains	25,000
Do.	Kirovgrad copper enterprise	Kirovgrad, central Ural Mountains	1,200
Do.	Sredneuralsk copper complex	Revda, central Ural Mountains	5,000
Do.	Uchali copper-zinc mining-beneficiation complex	Uchalinskiy Rayon, southern Ural Mountains	90,000
Metal	Chelyabinsk electrolytic zinc plant	Chelyabinskaya Oblast'	200,000
Do.	Elektrozink plant [Urals Mining and Metallurgical Company (UMMC)]	Vladikavkaz, North Caucasus	90,000
Do.	Uralelektromed plant [Urals Mining and Metallurgical Company (UMMC)]	Verkhnaya Pyshma	17,000
Zirconium, baddeleyite concentrate	Kovdor iron ore mining and beneficiation complex	Kola Peninsula	3,500

[e]Estimated; estimated data are rounded to no more than three significant digits. NA Not available.
[1]Table includes data and information available through November 2007.
[2]Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.
[3]Capacity estimates are totals for all enterprises that produce that commodity.

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TABLE 17
TAJIKISTAN: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2002	2003	2004	2005	2006
METALS						
Aluminum, primary		307,589	319,360	358,082	379,630	413,800
Antimony, Sb content of concentrate[e]		3,000	1,800	2,000	2,000	2,000
Gold[e]	kilograms	2,700	2,700	3,000	3,000	3,000
Lead, Pb content of concentrate[e]		800	800	800	800	800
Mercury, Hg content of concentrate[e]		20	30	30	30	30
Silver, Ag content of concentrate	kilograms	5,000	5,000	5,000 [e]	5,000 [e]	5,000 [e]
INDUSTRIAL MINERALS						
Cement		100,000	166,300	193,600	253,100	281,500
Fluorspar[e]		9,000	9,000	9,000	8,500 [r]	8,500
Gypsum		NA [r]	50,100 [r]	57,200 [r]	8,500 [r]	3,600 [e]
Nitrogen, N content of ammonia[e]		15,300 [r]	15,300 [r]	44,900 [r]	45,000 [r]	45,000
Salt		--	--	59,495	65,992	52,459
MINERAL FUELS AND RELATED MATERIALS						
Coal		35,500	46,500	92,900 [r]	98,500 [r]	102,400
Natural gas	thousand cubic meters	33,000	32,800	35,600 [r]	29,300 [r]	19,900
Petroleum, crude		16,100	17,700	18,900	21,600	22,300

[e]Estimated; estimated data are rounded to no more than three significant digits. [r]Revised. NA Not available. -- Zero.

[1]Table includes data available through November 2007.

[2]In addition to the commodities listed, Tajikistan produces a number of other mineral commodities for which available information is inadequate to make reliable estimates of output.

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TABLE 18
TAJIKISTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1, 2]

(Metric tons unless otherwise specified)

Commodity		Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Aluminum		Tajik aluminum plant (TadAZ)	Tursunzade	517,000
Antimony:				
Ore		Anzob mining-beneficiation complex	Dzhizhikrutskoye Sb-Hg deposit	700,000
Metal		Isfara hydrometallurgical plant	Isfara	500
Arsenic		Mosrif deposit	NA	NA
Bismuth		Leninabad mining-beneficiation complex	Yuzhno-Yangikanskiy deposit	25
Do.		Isfara hydrometallurgical plant	Isfara	500
Bismuth, copper, fluorspar, gold, silver, zinc (ore processing)		Adrasman mining-beneficiation complex	Kanimansurskoye deposit	650,000
Boron		Yakarkharskoye deposit	Badakhshan Region	NA
Coal		Isfara hydrometallurgical plant	Isfara	300,000
Do.		Shurab brown coal deposit	Shurab Region	NA
Do.		Fan-Yagnob hard coal deposits	Pyandzh Region	50,000
Copper-lead-zinc		Leninabad mining-beneficiation complex	Yuzhno-Yangikanskiy deposit	2,500
Dolomite		Yavan electrochemical complex	Pashkharvoskoye deposit	NA
Fluorspar, concentrate		Takob mining-beneficiation complex	Takob and Krasnye Kholmy deposits	60,000 [3]
Gold:				
In ore	kilograms	Tajikzoloto mining-beneficiation complex, Pamir Artel	Darvazy and Rankul placer deposits, placers in central and southern parts of the country	5,000 [3]
Do.	do.	Zerafshan Gold Company	Dzhilau and Taror deposits, Sughd Oblast'	2,500 [3]
Do.	do.	Darvaz joint venture	Yak-Suyskoye deposit, Khatlonskaya Oblast'	2,000
Do.	do.	Aprelevka joint venture	Aprelevka deposit	200
Ore processing	do.	Vostokredmet refinery	Chkalovsk	NA
Do.	do.	Kansayskaya factory	Aprelevka, Burgunda, Kyzyl-Chek, and Shkol'noye deposits	165,000 [3]
Lead-zinc		Kansayskoye mining complex	Kara-Mazar Region	NA
Do.		Altyn-Topkan mining directorate (China Global NewTechnology Export and Import)	Altyn-Topkan deposit (ore was processed until 2000)	NA
Do.		do.	Pay Bulak deposit (mining ceased in 1997)	NA
Do.		Adrasman mining-beneficiation complex	NA	NA
Do.		Takaeliyskiy metallurgical complex	NA	NA
Limestone		Dushanbe cement complex	Kharangonskoye deposit	NA
Loam		do.	Varzobskoye Ushchel'ye deposit	NA
Marble		Dashtak deposit	Darvaz region	NA
Do.		Jilikul deposit	Pendzhikent region	NA
Do.		Dal'yan Bolo deposit	Shakhristanskiy region	NA
Mercury		Anzob mining-beneficiation complex	Dzhizhikrutskoye deposit	150
Natural gas and petroleum:				
Natural gas	thousand cubic meters	Sixteen oil-gas deposits under exploration, which includes Ayritanskoye, Madaniyatskoye, and Ravatskoye	Fergana depression	200,000 [3]
Petroleum		Beshtentyakskoye, Kichik-Belskoye, Shaambary, and Uzunkhorskoye deposits	Southern Tajik depression	200,000 [3]
Salt		Yavan electrochemical complex	Tut-Bulakskoye deposit	NA
Do.		Voseyskiy plant	Khodzha-Muminskoye deposit	NA
Do.		Ashtskiy plant	Kamyshkurganskoye deposit	NA
Do.		Khoja-Sartez, Samanchi, and Tanabchi deposits	NA	NA
Silver		Adrasman mining-beneficiation complex	Bolshoy Kanimansur deposit	15,000
Strontium		Chaltash, Chilkutan, and Davgir deposits	Khatlon Region	180,000
Tin-tungsten		Tafkon deposit	NA	NA
Tungsten ore		Maykhura deposit	Central Tajikistan	150,000

See footnotes at end of table.

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TABLE 18—Continued
TAJIKISTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1, 2]

[e]Estimated; estimated data are rounded to no more than three significant digits. NA Not available.
[1]Table includes data and information available through November 2007.
[2]Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.
[3]Capacity estimates are totals for all enterprises that produce that commodity.

TABLE 19
TURKMENISTAN: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006
INDUSTRIAL MINERALS						
Bentonite[e]		50,000	50,000	50,000	50,000	50,000
Bentonite powder[e]		250	250	250	250	250
Bischofite[e]		100	100	100	100	100
Bromine[e]	kilograms	150,000	150,000	150,000	150,000	150,000
Cement[e]		450,000	450,000	550,000 [r]	650,000 [r]	800,000
Epsomite		NA	NA	NA	NA	NA
Ferrous bromide, 51% Br[e]		85	85	85	85	85
Gypsum[e]		100,000	100,000	100,000	100,000	100,000
Iodine[e]		200,000	200,000	250,000	270,000	270,000
Lime[e]		16,000	16,000	16,000	16,000	16,000
Nitrogen, N content of ammonia[e]		85,000	85,000	85,000	85,000	90,000
Salt[e]		215,000	215,000	215,000	215,000	215,000
Sodium sulfate[e]		60,000	60,000	60,000	60,000	60,000
Sulfur[e]		9,000	9,000	9,000	9,000	9,000
MINERAL FUELS AND RELATED MATERIALS						
Natural gas	million cubic meters	45,000	59,100	58,570	55,800	65,000
Petroleum, crude		8,919,000	9,306,000	10,051,000	9,700,000	9,000,000

[e]Estimated; estimated data are rounded to no more than three significant digits. [r]Revised. NA Not available.
[1]Table includes data available through November 2007.

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TABLE 20
TURKMENISTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1, 2]

(Metric tons unless otherwise specified)

Commodity		Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity
Ammonia	thousand metric tons	Maryzoat Association	Mary Region	400,000
Argillite	cubic meters	Keramzit plant	Yagmanskoye deposit	200,000
Barite-witherite		Arpaklenskiy mining enterprise	Arpaklen deposit	10,000
Do.		Kumytash deposit and other deposits	NA	NA
Bischofite, epsomite, Galauber's salt, sea salt		Karabogazsulfate Association	Kara-Bogaz-Gol Lagoon, off the Caspian Sea	NA
Bromine		Cheleken plant	Cheleken Region	4,740
Do.		Nebitdag plant	Nebitdag Region	2,370
Cement:				
From bench gravel and loam		Bezmeinskiy cement plant	Bezmeinskoye deposit	1,400,000 e
From limestone and clay		Kugitangskoye deposit	NA	NA
From limestone and marl		Gingol'skoye deposit	NA	NA
Clays:				
Bentonite		Oglanly Mine	Oglanly Region	100,000
Kaolin		Ashkhabad glass plant	Kyzylkainskoye deposit	80,000 e
Do.		Tuarkyrskoye deposit	250 kilometers southeast of Turkmenbashi	NA
Coal, oxidized		do.	do.	NA
Dolomite		Ashkhabad glass plant	Kelyatinskoye deposit	6,000 e
Gypsum		IA Turkmenmineral	Mukry, Tagorin deposits	300,000
Do.		Wastes from Gaurdak sulfur deposit	Gaurdak, Gora	400,000
Do.		Krasnovodsk Aylagy (anhydride) deposit	9 kilometers east of Turkmenbashi	160,000
Iodine		Cheleken plant	Cheleken Region	355
Do.		Nebitdag plant	Nebitdag Region	255 e
Limestone		Gaurdak deposit	4 kilometers northeast of Gaurdak	NA
Do.		Kara-Dzhumalakskoye deposit	60 kilometers from Gaurdak	NA
Limestone, for facing materials		Charshanginskoye, Gaurdakskoye, Geok-Tepinskoye, Kaylyu, Krasnovodsk Aylagy (tuff and granite), and Tyuzmergenskoye deposits	NA	NA
Do.	cubic meters	Tagarinskoye deposit	8 kilometers from Gaurdak	1,000 e
Limestone, for filling stone	do.	Aeroport deposit	21 kilometers northeast of Turkmenbashi	2,000
Do.	do.	Bekdashskoye deposit	200 kilometers north of Turkmenbashi	5,000
Do.	do.	Dostluksoye deposit	230 kilometers southeast of Turkmenbashi	2,000
Do.	do.	Mukrinskoye deposit	60 kilometers southwest of Gaurdak	25,000
Natural gas	million cubic meters	Achakskoye, Dauletabad, Doviet-Denmez (Donmez), Gygyrlinskoye, Ioltan, North and South Naipskiye, West Shatlykskiye, and Yashlar deposits	Onshore in eastern and southwestern parts of the country and offshore in the Caspian Sea; Amu-Dar'ya and Murgab Basins; Dashoguzskiy, Lebapskiy, and Maryyskiy deposits	90,000 e, 3
Natural pigment		Bakhchesu/Cheshme/Gadyn deposit	28 kilometers southwest of Serdar	NA
Ozokerite		Cheleken mining enterprise	NA	NA
Petroleum:				
Crude		Barsa-Gelmesskoye, Burunskoye, Cheleken, Gograndagskoye, Ioltan, Kamyshldzhinskoye, Korturtepinskoye, Kum Dag, Kuydzhikskoye, Okaremskoye, and Yashlar deposits	Onshore in southwestern part of the country and offshore in the Caspian Sea	5,500,000 e, 3
Refined	thousand metric tons	Refineries: Seydi refinery Turkmenbashi refinery	Locations: Chardzhou Rayon Turkmenbashi	12,000 3
Potash (sylvinite, carnallite)		Karlyuk deposit (experimental mine closed 1998)	25 kilometers from Gaurdak	NA
Do.		Karabil'skoye deposit	17 kilometers south of Gaurdak	NA

See footnotes at end of table.

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TABLE 20—Continued
TURKMENISTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1, 2]

(Metric tons unless otherwise specified)

Commodity		Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity
Quartz sand		Annauskoye, Babadurmazskoye, and Bakhardenskoye deposits	NA	NA
Rock salt		Gaurdak deposit	8 kilometers from Gaurdak	15,000 e
Do.		Khodzhaguymaskoye deposit	4 kilometers west of Gaurdak	NA
Do.		Kugitangskoye deposit	75 kilometers from Gaurdak	2,000 e
Do.		Uzun-Kudukskoye deposit	20 kilometers from Gaurdak	2,000 e
Salt		Kuulinskoye deposit	40 kilometers north of Turkmenbsahi	650,000 e
Sand and gravel	cubic meters	Dushaksoye deposit	NA	1,150,000
Do.	do.	Kala-I-Morskoye deposit	NA	925,000
Do.	do.	Kernayskoye deposit	NA	36,000
Do.	do.	Kubatayskoye deposit	NA	740,000
Do.	do.	Ufrinskoye deposit	NA	900,000
Sodium sulfate		Karabogazsulfate Association	Bekdash, Kara-Bogaz Lagoon (off the Caspian Sea)	400,000
Strontium (celesite)		Arikskoye deposit (mining ceased 1992)	Near Gaurdak	NA
Do.		Shakhtaminskoye deposit	do.	NA
Sulfur		IA Turkmenmineral	Gora deposit	340,000
Do.		Gaurdak plant	Gaurdak deposit (mining ceased 1997)	500,000 e
Do.		Darvaza, Segli-Kar, and Kara-Kum sulfur plants	Kara-kum deposit (mining ceased 1962)	NA
Do.		Kugitangskoye deposit	75 kilometers from Gaurdak	NA

eEstimated; estimated data are rounded to no more than three significant digits. NA Not available.
[1]Table includes data and information available through November 2007.
[2]Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.
[3]Capacity estimates are totals for all enterprises that produce that commodity.

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TABLE 21
UKRAINE: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006
METALS						
Alumina		1,351,000	1,434,050	1,562,170	1,632,020 r	1,671,620
Aluminum:						
Primary		112,459	113,640	113,151	114,224	92,067
Secondary		130,000	130,000	130,000	130,000	130,000
Total		242,459	243,640	243,151	244,224	222,067
Cadmium, metal e		25	25	25	25	25
Gallium e		14	13	14	15	15
Germanium e		10	20	20	20	20
Iron and steel:						
Iron ore, marketable:						
Gross weight		58,900,000	62,497,600	65,550,000 r	68,569,600	74,000,000 e
Fe content		32,300,000	34,300,000 e	36,000,000 e	37,700,000	40,700,000 e
Metal:						
Pig iron		27,560,000	29,570,000	31,060,000	30,747,000	32,926,000
Ferroalloys:						
Blast furnace: e						
Ferromanganese		85,000	85,000	79,000	30,000	30,000
Spiegeleisen		5,000	5,000	5,000	5,000	5,000
Electric furnace:						
Ferromanganese		250,617	250,000 e	375,990	359,000 r	373,000
Ferronickel e		41,000	--	78,000	78,000	90,000
Ferrosilicon		250,617	250,000 e	248,060	228,000 r	168,000
Silicomanganese		732,592	740,000 e	1,060,000	1,046,000 r	1,168,000
Other e		25,000	25,000	25,000	25,000	25,000
Total		1,389,826	1,360,000 r, e	1,871,050	1,771,000 r	1,859,000
Steel:						
Crude		34,538,000	36,900,000 e	38,738,000	38,636,000	40,899,000
Finished, rolled		26,400,000	22,500,000 r	23,200,000 r	22,180,000	22,387,000
Pipe		1,522,700	2,054,000	2,034,000	2,293,000	2,759,000
Lead, refined, secondary e		12,000	7,000	7,000	6,000	6,000
Magnesium, primary e		3	3	3	2,000	2,200
Manganese ore, marketable:						
Gross weight		2,469,600	2,590,900	2,362,000	2,260,000	1,606,400
Mn content e		840,000	880,000	810,000	770,000	550,000
Mercury		NA	--	--	--	--
Nickel: e						
Mine output, Ni content of laterite ore		2,000	2,000	2,000	6,000 r	12,000
Ni content of ferronickel		6,000	--	12,000	14,000	18,000
Silicon e		-- r	-- r	-- r	-- r	--
Titanium:						
Ilmenite concentrate:						
Gross weight		512,400	420,500	370,000 e	375,000 r, e	470,000
TiO_2 content, 61% e		313,000	257,000	226,000	229,000 r	287,000
Rutile concentrate, 95% TiO e		70,000	60,000	60,000	60,000	60,000
Metal, sponge e		6,200 e	6,934	7,497	8,397	9,997
Zirconium concentrates e		34,300	35,000	35,000	35,000	35,000
INDUSTRIAL MINERALS						
Bromine e	thousand kilograms	3,000	3,000	3,000	3,000	3,000
Cement		7,157,000	8,923,000	10,635,000	12,183,000	13,732,000
Clays:						
Ball clay		--	--	--	118,000	294,000
Bentonite e		300,000	300,000	300,000	300,000	300,000
Kaolin		225,000	225,000 e	225,000 e	217,000 r	251,000
Diamond, synthetic e	carats	8,000,000	8,000,000	8,000,000	8,000,000	8,000,000
Feldspar		NA	NA	NA	63,930	67,312

See footnotes at end of table.

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TABLE 21—Continued
UKRAINE: PRODUCTION OF MINERAL COMMODITIES[1, 2]

(Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006
INDUSTRIAL MINERALS—Continued						
Graphite[e]		7,500	7,500	7,500	7,500	7,500
Gypsum		207,000	264,000	337,000 r	380,600 r	375,900
Nitrogen, N content of ammonia		3,700,000	3,900,000 e	3,900,000 e	4,300,000	4,200,000 e
Potash, K_2O equivalent[e]		60,000	50,000 r	50,000	65,000	65,000
Salt		NA r	3,863,000 r	4,393,000 r	4,811,000 r	5,996,000
Soda ash[e]		679,000 r, 2	656,000 r, 2	650,000	700,000	700,000
Sulfur, native[e]		124,000	142,000	136,000	135,000	135,000
Sulfuric acid		935,000	1,113,000	1,425,000	606,000	1,493,000
MINERAL FUELS AND RELATED MATERIALS						
Coal, raw:						
Anthracite	thousand metric tons	15,000	14,427	18,295	16,204 r	16,592
Bituminous	do.	66,400	63,866	62,100	58,000	59,000
Lignite	do.	1,000	950	3,000	355 r	232
Total	do.	82,400	79,243	83,395	74,559 r	75,824
Marketable	do.	62,000	59,800	59,400	60,400	61,600
Coke		18,596,000	19,300,000 r	18,858,000	21,999,000	19,200,000
Natural gas	cubic meters	18,400,000	18,600,000 r	20,400,000 r	20,788,000 r	21,067,000
Peat, horticultural use and fuel use[e]		600,000 r	600,000 r	500,000 r	600,000 r	600,000
Petroleum:						
Crude and gas condensate:						
As reported	gravimetric tons	3,720,000	3,975,000	4,179,000	4,414,000 r	4,398,000
Converted[e]	42-gallon barrels	27,304,800	29,200,000	30,700,000	32,400,000 r	32,300,000
Refinery products		20,200,000	21,900,000	22,000,000 r	18,400,000 r	NA
Uranium:						
U content[e]		800	800	800	800	800
U_3O_8 content		943	943	943	943	943

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. NA Not available. -- Zero.
[1]Table includes data available through November 2007.
[2]Reported figure.

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TABLE 22
UKRAINE: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Alumina	Nikolayev refinery (RUSAL)	Mykolayivs'ka Oblast'	1,500,000
Do.	Zaporozhye (Dneprovsk) refinery	Zaporiz'ka Oblast'	245,000
Aluminum, primary	Zaporozhye (Dneprovsk) smelter (ZALK)	do.	120,000
Coal:			
Hard thousand metric tons	Donets coal basin with about 225 mines produces more than 90% of Ukraine's coal	Dnipropetrovs'ka, Donets'ka, and Luhans'ka Oblasts'	130,000 [3]
Do.	Lviv-Volynskiy Basin produces remainder from 18 mines	Western Ukraine	6,000,000 [3]
Brown	Dnipr (Dneprovskoye) Basin	Central Ukraine	7,000,000
Ferroalloys:			
Ferrochrome	Zaporozhye plant	Zaporiz'ka Oblast'	NA
Ferromanganese	do.	do.	NA
Do.	Nikopol' ferroalloys plant	Nikopol'	250,000
Ferromanganese, blast furnace	Kostyantynivka metallurgical plant	Donets Basin	NA
Do.	Kramatorsk metallurgical plant (production ceased in 1999)	NA	NA
Ferrosilicon	Nikopol' ferroalloys plant	Nikopol'	200,000
Do.	Stakhanov plant	Luhans'ka Oblast'	NA
Silicomanganese	do.	do.	1,200,000
Do.	Zaporozhye plant	Zaporiz'ka Oblast'	160,000
Do.	Nikopol' ferroalloys plant	Nikopol'	NA
Graphite	Zavalyevskiy graphite complex	Zavalyevskiy deposit	40,000
Iron ore:			
Underground mining	Krivbassruda production association with 16 mines	Kryvyy Rih Basin	15,000,000 [3]
Do.	Eksplutatsionnaya Mine of the Zaporozhye Iron Ore Integrated Works cjsc	do.	3,500,000
Open pit mining	Inguletskiy (Inhulets), Kamysh-Burunskiy, Kryvyy Rih, Poltavskiy, Severnyy (Pivnichny), Sukhaya Balka, Tsentralnyy, Yuzhniy (Pivdenny) and Zaporizhia mining-beneficiation complexes	do.	90,000,000 [3]
Kaolin	Prosyanovskoye mining-beneficiation complex	Dnipropetrovs'ka Oblast'	NA
Lead, secondary	Ukrtsink plant	Kostyantynivka	70,000
Magnesium	Zaporozhye plant	Zaporiz'ka Oblast'	10,000
Do.	Magnii concern	Kalush	18,000
Manganese:			
Ore, marketable	Marganets and Ordzhonikidze mining-beneficiation complexes	Nikopol' basin	6,000,000 [3]
	Tavricheskiy complex (under development)	Bol'shoy Tokmak basin	
Metal	Zaporozhye plant	Zaporiz'ka Oblast'	40,000
Sinter	Nikopol' ferroalloys plant	Nikopol	3,000,000
Mercury	Nikitovskiy mining-metallurgical complex	Donets'ka Oblast'	120
Nickel, Ni content in FeNi	Pobuzhskiy mining-beneficiation complex, comprising three open pit mines and smelter	Pobugskoye Basin	7,000 [3]
Potash, K_2O equivalent	Khlorvinil production association, Stebnik potash plant	Pricarpathian Region	300,000
Steel, crude	Donets'k acquisitions and (co-)owners:		
Do.	Industrial Union of Donbas (IUD):		
	Alchevs'k steel mill	Alchevs'k	4,500,000
Do.	Azovstal' steel mill	Mariupol'	4,000,000
Do.	Donets'k steel mill	Donets'ka Oblast'	1,300,000
Do.	Dnepropetrovsk pipe plant	Dnepropetrovsk Oblast'	NA
Do.	Khartsyzsk pipe plant	Donets'ka Oblast'	NA
Do.	Danko: Yenakiyeveskiy steel mill	NA	1,200,000

See footnotes at end of table.

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TABLE 22—Continued
UKRAINE: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Steel, crude—Continued	Donets'k acquisitions and (co-)owners—Continued:		
Do.	Privat Bank:		
	Dnepropetrovsk pipe plant	Dnepropetrovsk Oblast'	1,230,000
Do.	Zaporozhye rolling mill	Zaporiz'ka Oblast'	2,300,000
Do.	Dneprovskiy steel mill	Dniprodzerzhyns'k	3,850,000
Do.	do.	Dnipropetrovs'ka Oblast'	1,900,000
Do.	Kostyantynivka steel mill	Donets Basin	NA
Do.	Dneprospetstal	Zaporiz'ka Oblast'	1,400,000
Do.	Il'yich plant	Mariupol'	7,300,000
Do.	ISTIL mini-mill	Donetsk	1,000
Do.	Kirov plant	Makeyevka	4,000,000
Do.	Kryvy Rih plant	Kryvyy Rih	10,650,000
	Interpipe group:		
Do.	Nizhnedneprovsk pipe plant	NA	NA
Do.	Nikopol' pipe plant	NA	NA
Sulfur	Sera production association	Rozdol mining complex mines:	1,500,000 [3]
		Rozdol, Soroks, and Zdhidalchev deposits	
		Yarvorov complex mines:	
		Nemirov-Yazov deposits in Livivs'ka and Kyyivs'ka Oblasts'	
Titanium:	Facilities:		600,000 [3]
Ilmenite concentrate	Irshansk mining-beneficiation complex	Irsha Valley	
	Vol'nogorsk state mining-metallurgical complex	Dnipropetrovs'k Region	
	Verkhnedneprovsk mining-metallurgical complex	Verkhnedneprovsk Region	
Rutile	do.	do.	60,000
Do.	Vol'nogorsk state mining-metallurgical complex	Dnipropetrovs'k Region	NA
Sponge	Zaporozhye titanium-magnesium plant	Zaporiz'ka Oblast'	20,000
Uranium	Vostochnyy mining and beneficiation complex	Zheltye Vody	NA
Zinc, secondary	Ukrtsink plant	Kostyantynivka	25,000
Zirconium:			
Ore, zircon	Verkhnedneprovsk mining-metallurgical complex	Verkhnedneprovsk Region	100,000
Do.	Vol'nogorsk state mining-metallurgical complex	Dnipropetrovs'k Region	NA
Metal and compounds	Pridneprovsk chemical plant	Dnipropetrovs'ka Oblast'	NA
Do.	Kharkiv physical-technical institute	Kharkivs'ka Oblast'	NA

[e]Estimated; estimated data are rounded to no more than three significant digits. NA Not available.
[1]Table includes data and information available through November 2007.
[2]Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.
[3]Capacity estimates are totals for all enterprises that produce that commodity.

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TABLE 23
UZBEKISTAN: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006
METALS						
Aluminum, secondary[e]		3,000	3,000	3,000	3,000	3,000
Copper:[e]						
Mine output, Cu content		80,000	80,000	110,000 r	110,000 r	115,000
Metal:						
Blister, refinery, primary		75,000	75,000	93,770 r, 2	103,870 r, 2	110,000
Smelter, primary		75,000	75,000	94,000 r	105,000 r	110,000
Gold[e]	kilograms	90,000 [2]	90,000	93,000	90,000	85,000
Molybdenum, mine output, Mo content[e]		500	500	500	575 r	600
Rhenium[e]	kilograms	NA	NA	NA	NA	NA
Silver, mine output[e]	do.	80,000	80,000	80,000	83,000	83,000
Steel:						
Crude		450,000 e	472,000 e	602,166 r	607,253	730,000 e
Rolled		420,000 e	446,521	562,200	562,000	675,000
Zinc, metal, smelter, primary[e]		80,000 r	60,000 r	60,000 r	35,030 r, 2	35,000
INDUSTRIAL MINERALS						
Cement		4,062,200	4,804,800	5,067,800	5,068,000	5,000,000 e
Clays, kaolin[e]		5,500,000	5,500,000	5,500,000	5,500,000	5,500,000
Feldspar[e]		4,300	4,300	4,300	4,300	4,300
Graphite[e]		60	60	60	60	60
Iodine[e]	kilograms	2,000	2,000	2,000	2,000	2,000
Nitrogen, N content of ammonia		740,000	815,000 e	875,300	850,000 e	870,000 e
Phosphate rock:[e]						
Gross weight		425,000	430,000	430,000	430,000	600,000
P_2O_5 content		101,000	102,000	102,000	102,000	140,000
Sulfur:						
Byproduct:[e]						
Metallurgy		170,000	170,000	170,000	170,000	170,000
Natural gas and petroleum		350,000	350,000	350,000	350,000	350,000
Total		520,000	520,000	520,000	520,000	520,000
Sulfuric acid		841,800	802,400	834,300	740,500	600,000
MINERAL FUELS AND RELATED MATERIALS						
Coal		2,735,000	1,909,000	2,700,000	3,000,000 r	3,121,000
Natural gas	million cubic meters	57,670	57,481	59,864	59,686	58,000
Petroleum and gas condensate		7,198,000	7,134,000	6,580,000	5,490,000 r	5,410,000
Petroleum refinery products		5,500,000	5,807,000	7,749,000 r	4,600,000 r	4,600,000
Uranium:						
U content		1,860	1,598 r	2,016	2,300	2,260
U_3O_8 content		2,193	1,885 r	2,377	2,712	2,665

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. NA Not available.
[1]Table includes data available through November 2007.
[2]Reported figure.

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TABLE 24
UZBEKISTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1, 2]

(Metric tons unless otherwise specified)

Commodity		Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Bismuth		Ustarassay deposit (depleted)	Chotqol and Kuraminskiy Khrebet Regions	NA
Cesium, lithium, rubidium		Shava-Say deposit	NA	NA
Clays:				
Bentonite		Arab-Dasht and Khaudag deposits	NA	NA
Kaolin		Angren deposit	Angren Region	8,000,000
Coal		Central Asian Coal Association (mining):		
		Angren brown coal deposit	do.	6,000,000
Do.		Baysunskoye and Shargunskoye deposits	Surkhandarya Region	1,000,000 [3]
Copper:				
Mine output, Cu content		Almalyk mining-metallurgical complex	Dalneye, Kalmakkyrgan, and Sary-Cheku deposits	100,000 [3]
Metal		Almalyk refinery	Olmaliq	130,000
Diamond		Karashok and Kok-Say deposits	Nawoiy District	NA
Feldspar		Karichasayskoye and other deposits	Deposits in Samarqand and Tashkent Wiloyati Regions; Karakalpakstan (Kara-Kalpakskaya ASSR)	120,000 [3]
Fertilizers		Ammophos production association	Olmaliq	NA
Do.		Azot production association	Farghona	NA
Do.		Elektrokhimprom production association	Chirchiq	NA
Do.		Kokand superphosphate plant	Qo'qon	NA
Do.		Naviazot production association	Nawoiy Wiloyati	NA
Do.		Samarkand chemicals plant	Samarqand	NA
Fluorspar		Agata-Chibargata, Aurakhmat, Kengutan, Kyzylbaur, Naugarzan, and Nugisken deposits	East of Tashkent Wiloyati	150,000
Do.		Syrpatash deposit	Namanganskaya Oblast'	NA
Gold	kilograms	Adzhi-Bugutty, Amantaytau, Balpantau, Bulutkan, Donguz-Tau, Muruntau, and Taurbay deposits	Central Kyzylkum Region	85,000 [3]
Do.		Navoi Integrated Mining and Metals complex	Muruntau deposit	65
Do.		Kochbulak and Kyzyl-Al'ma-Say deposits	Tashkentskaya Oblast'	NA
Do.		Almalyk mining and metallurgical complex	Dalneye, Kalmakkyrgan, and Sary-Cheku deposits	NA
Graphite		Tadzhi-Kazgan deposit	Navoiyskaya Oblast'	NA
Iron ore		Syurenata deposit	Tashkentskaya Oblast'	NA
Lead, mine output, Pb content		Almalyk mining-metallurgical complex; Altyn-Topkan and Uchkulach deposits	Uchkulach deposit in Tashkent Wiloyati; Altyn-Topkan deposit in Kurama mountain range in Tajikistan (in March 1999, Altyn-Topkan transferred to control of Tajikistan)	40,000 [3]
Manganese		Dautashskoye deposit	Kashkadar'inskaya Oblast'	40,000
Molybdenum:				
Mine output, Mo content		Almalyk mining-metallurgical complex; Kalmakyr and Sarycheku deposits	Tashkent Wiloyati	900 [3]
Metal		Uzbek refinery and hard metals plant	Chirchiq	NA
Natural gas	million cubic meters	Gazli, Kandym, Khauzak, Kokdumalak, Pamuk, and Shurtan-Say deposits (major)	Amu-Dar'ya Basin; Mubarek area	70,000 [3]
Do.		Itera/Lukoil (Russia), Uzbekneftegaz JSC	Kan-Dam field	NA
Natural gas condensate		Trinity Energy (United Kingdom)	Ustyurt Plato Region	NA
Natural gas liquids	million cubic meters	Mubarek gas processing plant	Muborak	28,000
Do.		Shurtan gas-chemical complex	Shurtan-Say deposit, Kashkad'ya Region	137,000

See footnotes at end of table.

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TABLE 24—Continued
UZBEKISTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Petroleum:			
Crude	Kokdumalak and Mingbulak deposits (major)	NA	9,000,000 [3]
Refinery products	Fergana oil refinery	Farghona Region	8,800,000
Do.	Bukhara oil refinery	Bukhoro	2,500,000
Phosphate	Kyzyl Kum complex	Dzheroy-Sardarin Moroccan type; Karaktay, Severnyy and Dzhetymtau deposits	NA
Polyethylene	Shurtan gas-chemical complex	Shurtan-Say deposit, Kashkad'ya Region	125,000
Potash	Tyubegatan deposit	Southern Uzbekistan	NA
Silver	Kosmanachi, Okzhetpes, and Vysokovoltnoye deposits	Namanganskaya Oblast'	NA
Steel, crude	Bekabad steel mill	Bekabad	1,100,000
Sulfur	Mubarek gas processing plant complex	Muborak	2,000,000
Tungsten:	Deposits:	Locations:	1,200 [3]
Mine output, W content	Koytash deposit	Northeastern Uzbekistan	
	Ingichka and Lyangar deposits	Zirabulak Mountains	
	Ugat deposit	Northern Uzbekistan	
Mine output, WO_3 content (0.49%)	Sautbay wolframite deposit	Kyzylkum Region	NA
Metal	Uzbek refractory and hard metals plant	Chirchiq	NA
Uranium, U content	Navoi mining-metallurgical complex	Central Kyzylkum Region	3,000
Vermiculite cubic meters	Tebin-Bulak deposit	NA	25,000
Zinc:			
Mine output, Zn content	Almalyk mining-metallurgical complex	Khandiza and Uchkulach deposits	NA
Metal	do.	do.	80,000

[e]Estimated; estimated data are rounded to no more than three significant digits. NA Not available.

[1]Table includes data and information available through November 2007.

[2]Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.

[3]Capacity estimates are totals for all enterprises that produce that commodity.

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The Mineral Industry of Cyprus

By Harold R. Newman

The mineral industry of Cyprus[1] has made a small but increasing contribution to the Cypriot economy, accounting for about 0.3% of the gross domestic product in 2006. The mineral industry provided raw materials for the domestic construction and manufacturing industries (Mining Journal Online, 2006).

The production of bentonite, cement, sand and gravel, and stone dominated the mineral industry of Cyprus. Other mineral commodities produced included common clay, gypsum, ocher, perlite, and umber. In northern Cyprus, the mineral industry consisted mainly of the production of construction aggregates, stone, and umber.

Production

Hellenic Copper Mines Ltd.'s copper mine and solvent extraction-electrowinning operations at Skouriotissa were closed in 2005. Production resumed briefly in 2006.

Eastern Mediterranean Minerals Ltd. (EMED) of Cyprus, which was a joint venture of Eastern Mediterranean Resources Public Ltd. of Cyprus (95%) and Hellenic Mining Co. of Cyprus (5%), began a prefeasibility study in 2006 of its Klirou copper-zinc project, with a view of moving to full feasibility study in 2007. EMED's exploration areas in Cyprus were centered on the Troodos ophiolite complex. The targeted mineralization areas were volcanic-hosted massive sulfide copper deposits, similar to the larger copper mines that produced in the past, three of which exceeded 10 million metric tons of ore at grades of between 1% and 4% copper (EMed, 2006).

The reported existence of natural gas and petroleum prompted the Government to introduce legislation to regulate the natural gas and petroleum sectors and to claim the Exclusive Economic Zone (EEZ) of the island in accordance with the United Nations Law of the Sea Convention. The Government adopted the Contiguous Zone Law of 2004 and the Exclusive Economic Zone Law of 2004. In May 2006, the Government of Cyprus and the Government of Egypt signed an agreement on the joint development of hydrocarbon sources straddling the demarcation line that separates the EEZ of the two countries (Mondaq, 2006).

Structure of the Mineral Industry

Table 2 is a list of major mineral industry facilities.

Outlook

In 2006, industrial infrastructure construction is expected to maintain the domestic demand for cement, gypsum, sand and gravel, and stone. International demand from the cat litter, construction, oilfield drilling fluids, and pigments industries is expected to maintain Cypriot exports of bentonite, gypsum, perlite, and umber.

References Cited

EMed, 2006, EMed study on: EMed, 1 p. (Accessed September 3, 2007, at http://emed-mining.com/site/dmdocuments/Mining_Journal_29_Aug_06.pdf.)

Mining Journal Online, 2006, Countries and commodities reports—Cyprus: Mining Journal Online, p. 1. (Accessed January 29, 2007, via http://www.mining-journal.com/Annual_Review.aspx.)

Mondaq, 2006, Developments in the Cypriot offshore oil and gas industries: Mondaq, July 3. (Accessed February 1, 2007, at http://www.mondaq.co.uk/article.asp?articleid=40810&1k=1.)

[1]Unless specifically stated, all data in this chapter are for the Republic of Cyprus in southern Cyprus because data related to areas of northern Cyprus administered by Turkish Cypriots are sparse or unavailable. The two areas have been separated since 1974.

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TABLE 1
CYPRUS: PRODUCTION OF MINERAL COMMODITIES[1, 2]

(Thousand metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006[e]
Cement, hydraulic		1,438	1,637	1,689	1,805	1,786 [3]
Clays:						
Bentonite	metric tons	128,400	144,859	155,717	172,366	150,620 [3]
Other:						
For brick and tile manufacture		350	350 [e]	425	443	400
For cement manufacture		480	550	565	600	540 [3]
Total		830	900 [e]	990	1,043	940
Copper, refined	metric tons	3,695	2,552	1,240	--	880 [3]
Gypsum, crude[4]	do.	295,000	300,000	255,000	210,000	264,000 [3]
Lime, hydrated	do.	12,190	13,370	13,990	16,589	14,913 [3]
Petroleum refinery products:[5]						
Liquefied petroleum gases	thousand 42-gallon barrels	378	330	102 [r]	--	--
Gasoline	do.	1,313	1,242	336 [r]	--	--
Kerosene and jet fuel	do.	281	301	80 [r]	--	--
Distillate fuel oil	do.	2,704	2,437	657 [r]	--	--
Residual fuel oil	do.	2,914	2,411	774 [r]	--	--
Asphalt and bitumen	do.	217	194	42 [r]	--	--
Other	do.	17	--	--	--	--
Total	do.	7,824	6,916	1,991 [r]	--	--
Sand and stone:						
Limestone, crushed (Havara)		2,000	1,000	1,200	1,000	700 [3]
Marble		2	2	1	2	1 [3]
Marl, for cement production		1,950	2,220	2,290	2,450	2,210 [3]
Sand and gravel[6]		10,500	10,700	11,600	12,064	12,199 [3]
Building stone[7]		80	103	105	51	57 [3]
Sulfur[e]	metric tons	1,300	1,300	300	--	--
Umber	do.	5,500	5,500	5,205	5,088	15,167 [3]

[e]Estimated; estimated data are rounded to no more than three significant digits. [r]Revised. --Zero.

[1]Table includes data available through August 30, 2007.

[2]Small quantities of the mineral pigments ocher and terra verte are mined intermittently. Mineral production data from areas of northern Cyprus that are administered by Turkish Cypriots and production of fertilizers, perlite, and secondary metals from scrap are not included in this table because available information is inadequate to make estimates of output.

[3]Reported sources of data include company annual reports, the Mines Service, and the Statistical Service of Cyprus.

[4]About 4,000 metric tons per year of gypsum was calcined.

[5]Refinery closed in April 2004. Petroleum refinery products are rounded to the nearest thousand barrels; may not add to totals shown.

[6]Includes crushed aggregate.

[7]Includes crude, semifinished, and worked stone.

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TABLE 2
CYPRUS: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Metric tons unless otherwise specified)

Commodity	Major operating companies and and major equity owners	Location of main facilities	Annual capacity
Aluminum:			
Secondary	A & E Aluminium Recycling Ltd.	Nicosia	NA
Semimanufactures	Muskita Aluminum Industries Ltd.	Extrusion presses, Limassol	18,000
Cement	Vassiliko Cement Works Ltd.	Vassiliko	1,260,000
Do.	Cyprus Cement Co. Ltd.	Moni	400,000
Do.	Bogaz Endustri ve Madencilik	Near Famagusta, Northern Cyprus	150,000
Clay, bentonite	Peletico Penta Ltd.	Mines at Pentakomo and Troulli	300,000
Do.	Hellenic Mining Co.	NA	NA
Do.	Drapia Mining Co. Ltd.	Drapia, Monagroulli, and Parsata	(1)
Do.	Oryktako Ltd.	Mine at Kato Moni and processing plant at Malounda	10,000
Do.	C & A Quarries Ltd.	NA	NA
Copper, cathode	Hellenic Copper Mines Ltd.	Skouriotissa	(2)
Gypsum	Peletico Ltd.	Quarry and processing plant at Aradipou, near Larnaca	NA
Do.	Zeiplast Chemical Industries Ltd.	Near Moni	NA
Perlite	Peletico Ltd.	Expanded perlite facility at Larnaka	NA
Do.	Zeiplast Chemical Industries Ltd.	Expanded perllite facility at Moni	NA
Petroleum, crude	Cyprus Petroleum Refinery Ltd.	Larnaca	(3)
Steel, semimanufactures	B.M.S. Metal Pipes Industries Ltd.	Tube and pipe mill, Paphos	15,000

NA Not available.
[1]Inactive
[2]Production ceased in January 2005.
[3]Refinery closed in April 2004. Conversion of facility to petroleum product storage terminal that began in 2004 was continuing.

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THE MINERAL INDUSTRIES OF DENMARK, THE FAROE ISLANDS, AND GREENLAND

By Harold R. Newman

DENMARK

Denmark has an industrialized market economy and the country's economic growth depended on imported raw materials and foreign trade. Demark exported energy, food products, instruments, and machinery. The production of natural gas and petroleum from the Denmark area of the North Sea was continuing.

Production

The country has no metallic mineral resources. It does, however, have reserves of industrial minerals, such as chalk, clays, limestone and sand and gravel that were produced in 2006 (table 1).

Structure of the Mineral Industry

The Danish mineral industry was mostly privately owned. Table 2 is a list of the country's major mineral industry facilities.

Commodity Review

Industrial Minerals

Calcium Carbonate.—Faxe Kalk A/S, which was owned by the Loist Group of Belgium, was a major producer of calcium carbonate from its deposits on the island of Zealand. Faxe was the only company in Denmark to use calcium carbonate sources (oyster shells) other than chalk. Faxe was also the leading producer of lime in Denmark (Industrial Minerals, 2007).

Reference Cited

Industrial Minerals, 2007, Denmark: Industrial Minerals, January, p. 26.

FAROE ISLANDS

The Faroese economy depended on fishing and salmon farming and was aided by a substantial annual subsidy from Denmark. Potential discoveries of oil in the Faroese area gave hope for eventual oil production and diversification of the economy. Foreign oil companies were engaged in geophysical exploration and well drilling offshore. The Faroe Islands have no known significant mineral resources.

The Faroese Petroleum Administration of the Ministry of Trade and Industry agreed to move drilling commitments in the 001 and 003 licenses to license 006. As a result, a well was to be drilled offshore on the Brugdan prospect in the summer of 2006. The investors were Statoil A/S (27.15%) as operator, DONG Energy A/S of Denmark (21.91%), Anadarko Petroleum Corp. of the United States (13%), Enterprise Oil plc of the United Kingdom (12.47%), Hess Corp. of the United States (formerly Amerada Hess Corp.) (11.09%), BG Group plc of the United Kingdom (10.31%), Faroe Petroleum plc (4.04%), and Atlantic Petroleum (0.025%). Statoil stated that Brugdan would be challenging to interpret because it lies under thick sections of volcanic rock. The well would be drilled by the Stena Don semisubmersible rig to a depth of 450 meters (Petroleum Economist, 2006).

Reference Cited

Petroleum Economist, 2006, Faroe Islands: Petroleum Economist, v. 73, no. 1, January, p. 41.

GREENLAND

Greenland is a self-governing overseas administrative division of Denmark. About one-half of the Government revenues came from grants from the Danish Government. The private and public sectors contributed to Greenland's economy. Hydrocarbon and mineral exploration activities were the focuses of foreign investment. Exploration was most active for base metals, diamond, gemstones, gold, nickel, and platinum-group metals (PGM).

The European Union (EU) was to expand its existing partnership agreement with Greenland to include the exploitation of the island's mineral resources. The agreement would expand the amount of EU grants and loans available for Greenland exploitation starting in 2007 (Mining Journal Online, 2006b).

Commodity Review

Metals

Aluminum.—The Government of Greenland and Alcoa Inc. of the United States began a joint study of the possibility of constructing an aluminum smelter and associated hydropower plant. If the study results were positive and the project was approved for development, then construction could take between 5 and 10 years to complete (Mining Journal Online, 2006a).

Nickel.—The Ammassalik nickel project in eastern Greenland, which was owned by Diamond Fields International Ltd. of South Africa, consisted of two adjacent properties that had a combined area of 63,737 hectares (ha); it had been found to have associated copper, nickel, and PGM mineralization. Diamond Fields assessed its data and data from a report by Inco Ltd. of Canada (which was based on previous drilling by Inco) to determine if further exploration was warranted. Diamond Fields subsequently concluded an agreement with Inco

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regarding the Ammassalik Block. The agreement granted Inco the option to earn a 65% interest in the block by spending up to $3 million by the end of 2008 (Diamond Fields International Ltd., 2006).

Lead and Zinc.—According to a resource report by Wardell Armstrong International, Angus & Ross plc of the United Kingdom indicated the that reopening of its Black Angel Mine in western Greenland was viable and that a number of options for reopening the mine were being considered. The mine had been closed in 1990 and was last inspected in 1997. Angus & Ross completed an extensive drilling program in 2006. The program established the existence of about 2 million metric tons (Mt) of mineral resources around the Black Angel Mine. This amount does not include the 1.6 Mt of proven and probable reserves with an average combined lead/zinc grade of 21.6% that remained in the Black Angel Mine (Minex Online, 2006).

Industrial Minerals

Diamond.—Hudson Resources Inc. reported that it had completed more than 3,000 meters (m) of drilling on 12 holes in the Garnet Lake area where a diamondiferous kimberlite was discovered, and in the Spider Lake area, where diamondiferous kimberlite dikes radiated from a deep-seated circular anomaly. Significant diamond recoveries were known at four locations in the Garnet Lake area. Hudson reported that it had recovered the largest diamond ever recovered in Greenland from this exploration effort. The stone, which weighed 0.122 carat, was recovered from a sample from a kimberlite dyke that measured 4.5 m in thickness. Hudson stated that the find confirmed the highly diamondiferous nature of the dyke (Mining Journal Online, 2006c).

Mineral Fuels

Petroleum.—Twelve companies advanced to the prequalification stage under the first phase of Greenland's round of licensing for petroleum blocks. The prequalification stage closed on December 15, 2006. Greenland was offering eight blocks that covered about 92,000 square kilometers for exploration off Disko-Nuussuag in west-central Greenland. There have been numerous oil seeps in Cretaceous sandstones and Paleocene volcanics in western Greenland. Licenses would be offered for a maximum exploration period of 10 years, with a right to a 30-year extension for production (Oil and Gas Journal, 2006).

References Cited

Diamond Fields International Ltd., 2006, Annual report—Greenland: Vancouver, British Columbia, Canada, Diamond Fields International Ltd. 2006, p. 7.

Minex Online, 2006, Significant new resource added to Black Angel property: Greenland Mineral Exploration Newsletter, no. 29. (Accessed October 11, 2007, at http://www.geus.dk/minex/minex-29-uk.htm.)

Mining Journal Online, 2006a, Alcoa in Greenland: Mining Journal Online. (Accessed February 11, 2007, at http://www.mining-journal.com/Subscribers/journal_Article.aspx?=8929.)

Mining Journal Online, 2006b, EU Greenland support: Mining Journal Online. (Accessed February 11, 2007, at http://www.mining-journal.com/Subscribers/journal_Article.aspx?=8880.)

Mining Journal Online, 2006c, Greenland record: Mining Journal Online. (Accessed February 4, 2007, at http://www.mining-journal.com/Subscribers?Journal_Article.aspx?articleid=12467.)

Oil and Gas Journal, 2006, Twelve firms advance in Greenland licensing: Oil and Gas Journal. (Accessed November 24, 2006, at http://www.ogj.com/articles/article_display.cfm?article_id=277939.)

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TABLE 1

DENMARK: ESTIMATED PRODUCTION OF MINERAL COMMODITIES[1, 2]

(Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006
Aluminum, metal, secondary		18,000	18,000	20,000	20,000	25,000
Cement, hydraulic		2,010,000	2,020,000	2,050,000	2,070,000	2,060,000
Chalk		1,900,000	1,900,000	1,950,000	1,950,000	1,900,000
Clays:						
Bentonite		14,539 r, 3	16,303 r, 3	18,352 r, 3	18,515 r, 3	18,500
Fire clay		25	25	25	25	25
Kaolin		2,500	2,500	2,500	2,500	2,500
Moler, extracted	thousand cubic meters	230	232	233	234	240
Other		6,000	6,000	6,000	5,500	5,000
Gas:						
Manufactured	million cubic meters	1,500	1,500	1,500	1,500	1,500
Natural:						
Gross	do.	8,100	8,300	9,000	9,500	9,500
Marketable	do.	7,300	7,300	8,200	9,200	9,200
Iron and steel, metal, steel:						
Crude[4]	thousand metric tons	392 [3]	-- [3]	-- [3]	-- [3]	-- [3]
Semimanufactures	do.	379 r	429 r	516 r	-- r	--
Lime, hydrated and quicklime		114,000	115,000	116,000	120,000	115,000
Natural gas plant liquids	thousand 42-gallon barrels	46,700 [3]	46,000	47,000	48,000	48,000
Nitrogen, N content of ammonia		1,600	1,600	1,600	1,600	1,600
Peat		290,000	295,000	296,000	298,000	298,000
Petroleum:						
Crude	thousand 42-gallon barrels	132,900 [3]	133,000 [3]	144,465 r, 3	142,000 r	140,000
Refinery products:						
Liquefied petroleum gas	do.	1,195 [3]	1,232 [3]	1,902 r, 3	1,800 r	1,800
Gasoline	do.	15,205 [3]	15,264 [3]	16,881 r, 3	15,400	16,000
Naphtha	do.	-- [3]	--	51 r, 3	50 r	50
Jet fuel	do.	3,878 [3]	4,479 [3]	4,848 r, 3	4,800	4,800
Distillate fuel oil	do.	23,886 [3]	25,300 [3]	24,834 r, 3	26,000	26,000
Refinery gas	do.	2,141 [3]	2,331 [3]	2,100 r, 3	2,200	2,200
Residual fuel oil	do.	11,540 [3]	11,136 [3]	10,370 r, 3	11,300	11,300
Total	do.	57,845 [3]	59,742 r, 3	60,986 r, 3	61,600 r	62,200
Phosphates, crude, gross weight		1,300	1,400	1,400	1,400	1,400
Salt, all forms		600,000	560,000 r	610,000	610,000	600,000
Sand and gravel:						
Onshore	thousand cubic meters	27,000	27,000	28,000	28,400	28,000
Offshore	do.	700	600	600	600	600
Total	do.	27,700	27,600	28,600	29,000	28,600
Of which sand, industrial (sales)	do.	490	500	500	500	500
Stone:						
Dimension (mostly granite)		25,000	26,000	26,000	27,000	26,000
Limestone:						
Agricultural		700,000	700,000	700,000	700,000	700,000
Industrial		250,000	250,000	250,000	250,000	250,000
Sulfur, recovered		4,386 r, 3	4,751 r, 3	4,660 r, 3	4,223 r, 3	4,500

rRevised. -- Zero.

[1]Estimated data are rounded to no more than three significant digits; may not add to totals shown.

[2]Table includes data available through October 1, 2007.

[3]Reported figure.

[4]Danish Steel Works Ltd. Ceased production in 2002.

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TABLE 2
DENMARK: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Cement		Aalborg Portland A/S	Plant at Rordal	3,000
Chalk		A/S Faxe Kalkbrud	Quarries at Stevns and Sigerslev	250
Diatomite (moler)	thousand cubic meters	Dansk Moler Industri A/S (Damolin)	Quarries on Mors and Fur Islands	145
Kaolin		Aalborg Portland A/S	Mine and plant on Bornholm Island	25
Lime		A/S Faxe Kalkbrud (Aalborg Portland Holding A/S)	Plant at Stubberup, near Fakse, on Zealand Island	200
Natural gas	million cubic meters	Maersk Olie og Gas A/S	Roar and Tyra Gasfields, Danish North Sea	2,550
Petroleum:				
Crude	barrels per day	Dansk Undergrounds Consortium	Dan, Gorm, Rolf, and Tyra, Danish North Sea	127,000
Refined	do.	A/S Dansk Shell	Fredericia	55,000
Do.	do.	Kuwait Petroleun Refining A/S	Gulfhavn	56,500
Do.	do.	Statoil A/S	Kalundborg	65,000
Salt		Dansk Salt I/S	Mine (brine) at Hvornum, plant at Mariager	600
Steel		Danish Steel Works Ltd. (Det Danske Stalvalsevaerk A/S) (30% Government owned)	Plant at Frederilsvaerk (closed)	750

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The Mineral Industries of Estonia, Latvia, and Lithuania

By Richard M. Levine

ESTONIA

In 2006, Estonia continued its economic expansion with the gross domestic product (GDP) increasing by 9.8% compared with that of 2005 (U.S. Department of State, 2007). Estonia's mining industry was primarily engaged in extracting oil shale, peat, and industrial minerals, which included clays, limestone, and sand and gravel.

The AS Silmet plant in northeastern Estonia was one of the leading rare metals and rare-earth metal producers in Europe. Silmet employed about 550 people. The plant included a factory for rare-earth metals separation, a factory for rare metals production, and a metallurgical factory. The factory for rare-earth metals separation produced such products as fluorides, hydroxides, oxides, carbonates, and solutions, as well as liquid nitric fertilizers. The factory for rare metals produced rare metals, hydroxides, oxides, and ammonium bifluoride. The metallurgical factory produced metallic products, which included niobium and tantalum chips, metallic powders and hydrides, and rare-earth metal products, which included neodymium metal ingots, neodymium ferroboron alloys, and mischmetal. About 99% of the raw materials used in production at Silmet were imported and 99% of the products sold were exported (AS Silmet, 2008).

Estonia met more than 90% of its electricity needs with locally mined oil shale. The country imported all its natural gas and petroleum, which equaled about 30% of its total energy consumption, from Russia. Alternative energy sources, which included biomass, peat, and wood, made up about 9% of primary energy production. An undersea electricity cable commissioned in December 2006 allowed Estonia to export electricity to Finland (U.S. Department of State, 2007).

Estonia had 64 ports along its coast, 31 of which handled commercial shipping and were open to vessels from other countries. Oil refinery products from Russia made up more than 50% of the cargo handled at the country's ports. The Port of Tallinn was the country's largest port in terms of freight handled. In the area of mineral shipments, Muuga Harbor, which was the main cargo handling harbor for the Port of Tallinn, handled crude oil and petroleum refinery products. Paldiski South Harbor of the Port of Tallinn handled scrap metal, Paljassaare Harbor of the Port of Tallinn handled petroleum refinery products and coal, Kunda Port handled cement, Sillamäe Port handled metals and petroleum refinery products, and AS Parnu Sadam Port handled peat (Enterprise Estonia, 2008).

Production

Silmet, which was Estonia's main metal-producing enterprise, annually produced up to 3,000 metric tons (t) of rare-earth products and 700 t of rare metal products (AS Silmet, 2008). Silmet was reportedly one of the world's leading producers of niobium metal chips (Sillamäe, 2007). Estonia was the leading producer of oil shale in Europe and had been mining high-grade marine oil shale (kukersite of Ordovician age) for many years. In 2006, more than 14 million metric tons (Mt) of oil shale was mined from several underground and open pit mines (table 1). About 85% of the oil shale was burned as fuel in several large electric powerplants in northeastern Estonia. The remainder was retorted for shale oil, which is used in the manufacture of fuels and petrochemicals (Dyni and Johnson, 2006). Oil shale production decreased by about 3% in 2006 compared with that of 2005. Cement production increased in 2006 in line with the country's economic growth; production data for other construction materials was lacking for 2006, although annual data had been reported in the past.

Structure of the Mineral Industry

Most of Estonia's mineral production was privately owned. Silmet was privatized in 1997 (AS Silmet, 2008). In 2005, the Estonian Silmet Group sold its majority holding in Silmet to Zimal SA of Switzerland, which controlled the Revda loparite mine (located in Russia) and the Solikamsk magnesium works (also located in Russia) through the Russian holding company Mineral Group (Estonian Economy, 2006). Oil shale production was under the control of Eesti Energia, which was a state-owned company engaged in the production, sale, and transmission of electric power. The oil shale, which was extracted from mines owned by Eesti Energia, was the company's main raw material for energy production (Eesti Energia, 2008). Oil shale production was conducted by Eesti Põlevkivi [Estonian Oil Shale Company], which was a subsidiary of Eesti Energia (Oil Shale Symposium 2009).

References Cited

AS Silmet, 2008, Overview: AS Silmet. (Accessed December 10, 2008, at http://www.silmet.ee/default.aspx?m1=48&m2=51&lang=1.)

Dyni, J.R., and Johnson, R.C., 2006, Will oil shale be a major player?: AAPG Explorer, May. (Accessed December 7, 2008, at http://www.aapg.org/explorer/divisions/2006/05emd.cfm.)

Eesti Energia, 2008, About us: Eesti Energia. (Accessed December 7, 2008, http://www.energia.ee/index.php?id=1&L=1.)

Enterprise Estonia, 2008, Transportation: Estonian Economy, June. (Accessed December 8, 2008, at http://www.investinestonia.com/index.php?option=displaypage&Itemid=111&op=page&SubMenu=.)

Estonian Economy, 2006, Industry: Estonian Economy, January. (Accessed December 10, 2008, at https://www.static.vm.ee/static/Failid/101/Economy-Jan2006.pdf.)

Oil Shale Symposium 2009, 2008, Field trips: Oilshalesymposium.com. (Accessed December 11, 2008, at http://www.oilshalesymposium.com/index.php?id=13.)

Sillamäe, 2007, Business in Sillamäe: Sillamäe, May 3. (Accessed December 10, 2008, at http://www.sillamae.ee/index.php?page=366&&PHPSESSID=ab93a1f73565f1eda6a3fb789d2d146e.)

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U.S. Department of State, 2007, Estonia: U.S. Department of State background note, October. (Accessed December 8, 2008, at http://www.state.gov/r/pa/ei/bgn/5377.htm.)

LATVIA

Latvia had the Baltic states' only steel mill. Other mineral commodity production was confined to industrial minerals used in construction, peat extraction, and production of a small amount of natural gas. In 2006, the country's GDP increased by 11.9% compared with that of 2005 (U.S. Central Intelligence Agency, 2008).

Latvia's major role in the world mineral economy was as a transshipper of mineral products. The country's three main ports are Liepaja, Riga, and Ventspils, all of which mostly transited cargoes to and from the Commonwealth of Independent States (CIS) countries.

In terms of the volume of transshipments, Ventspils was the largest port in Latvia as well as on the Baltic Sea. Ventspils handled more than 25 Mt of cargo in 2006, which included crude oil, petroleum products, and potash. Ventspils Nafta Terminal LTD was the Baltic Sea region's leading oil and petroleum product transshipment terminal. Crude oil and petroleum products are received by pipeline and railways. The tank farm capacity of the enterprise exceeded 1 million cubic meters, which enabled the clients of the terminal to store products in case there was no immediate transshipment possibility owing to conditions (such as weather) or in expectation of a better market price. The terminal also included among its services chemical analysis of oil and petroleum products in the company laboratory (Ventspils Freeport Authority, 2008).

The Freeport of Riga, which is the country's second largest port, handled such cargo as mineral fertilizers, petroleum products, and various metals. About 80% of the products handled were transshipped to and from the CIS (Riga Freeport Authority, 2008).

The Port of Liepaja handles one-third less cargo than the Freeport of Riga. Its mineral product cargo is mainly metals and mineral fertilizers.

Production

The growth in Latvia's economy appeared to spur an increase in the production of mineral commodities used in infrastructure development, although information on the production of cement and steel was not reported for 2006. Data on mineral production are provided in table 1.

Structure of the Mineral Industry

The Ports of Riga and Ventspils operated as freeports and the Port of Liepaja was part of the Liepaja Specialized Economic Zone. The country's only steel mill, Liepajas Metalurg, was the country's main mineral industry enterprise; it was a public joint-stock company (Liepajas Metallurgs, 2007).

References Cited

Riga Freeport Authority, 2008, Freeport of Riga in facts and figures, 2008, Riga Freeport Authority. (Accessed November 26, 2008, at http://www.freeportofriga.lv/eng/fakti.asp.)

Ventspils Freeport Authority, 2008, Ventspils Freeport: Ventspils Freeport Authority. (Accessed November 26, 2008, at http://www.portofventspils.lv/?lang=EN&menu=13.)

Liepajas Metallurgs, 2007, Quarterly report for the first nine months of the year 2007: Liepajas Metallurgs. (Accessed November 26, 2008, at http://www.baltic.omxnordicexchange.com/upload/reports/lme/2007-q3_en_uni_(00_ias.pdf.)

U.S. Central Intelligence Agency, 2008, Latvia, *in* World factbook 2008: U.S. Central Intelligence Agency. (Accessed November 26, 2008, at https://www.cia.gov/library/publications/the-world-factbook/geos/lg.html.)

LITHUANIA

Lithuania's main mineral commodity production enterprises were its nitrogen fertilizer enterprise in Jonava and its petroleum refinery near Mazeikai. The country also produced industrial mineral products, which included cement, clays, and sand and gravel, and mineral fuels, which included peat and crude petroleum. Lithuania had the Baltic states' only nuclear powerplant at Ignalina, which generated more than 85% of the electric power produced in Lithuania. The reactors at the plant, however, are of the RBMK-2 model, which is the model that was involved in the accident at the Chernobyl plant in Ukraine (Energy Daily, 2007).

The country's Port of Klaipeda was a major transshipment center for mineral products, and, in particular, fertilizers and crude oil and petroleum products. The completion of upgrades at the Butinge terminal at the Port of Klaipeda, which is connected to the Russian oil pipeline system, increased the country's ability to export crude oil and petroleum refinery products from Russia (U.S. Energy Information Administration, 2006).

Production

In 2006, Lithuania's GDP grew at a rate of 7.5%, which stimulated production of construction materials used in building the country's infrastructure. Most industrial minerals used in construction experienced an increase in output compared with that of 2005. Production of most fuels decreased somewhat in 2006, however, compared with that of 2005. In June, Russia cut off pipeline supplies to Lithuania's Mazeikiu Nafta refinery reportedly owing to technical problems caused by an accident on the pipeline that supplied the refinery. The accident took place shortly after the sale of the refinery to the Polish refiner PKN Orlen (Graham, 2006). The refinery then had to transport oil from Butinge—a distance of 90 kilometers (Interfax Central Europe News Agency, 2007). Additional data on mineral production are provided in table 1.

Achema AB, a nitrogen fertilizer and chemical products manufacturer, was the country's other major mineral production enterprise. Its production of fertilizers exceeded 2 Mt/yr and included compound and nitrogenous fertilizers (Achema AB, 2008a).

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Structure of the Mineral Industry

Yukos International UK BV, a United Kingdom-based subsidiary of the Russian oil producer Yukos Oil, sold its Lithuanian refinery Mazeikiu Nafta to the Polish refiner PKN Orlen in December 2006. PKN Orlen was the leading oil refiner in Central Europe and was part-owned by the Polish Government. PKN Orlen owned a number of refineries and gas stations in the Czech Republic, Germany, and Poland. Mazeikiu Nafta, which was one of Lithuania's most important strategic assets, had been purchased by the Yukos Oil subsidiary in 2002. In December 2003,Yukos' head office in Russia was presented with the first of several very large tax bills, which bankrupted Yukos within a year. The Russian state oil firm Rosneft purchased much of Yukos' debt and demanded a say in any potential sale of Mazeikiu Nafta. Yukos' UK subsidiary contested Rosneft's claim in a legal dispute that was decided in favor of the sale to PKN Orlen (Moldova.org, 2006).

Achema AB, Lithuania's nitrogen fertilizer enterprise, was privatized in 1994; Achema AB employed more than 1,600 employees in 2006 (Achema AB, 2008b).

References Cited

Achema AB, 2008a, About AB "Achema": Achema AB. (Accessed December 9, 2008, at http://www.achema.lt/about.)

Achema AB, 2008b, History: Achema AB. (Accessed December 9, 2008, at http://www.achema.lt/history.)

Energy Daily, 2007, General Electric interested in Lithuania nuclear power plant project: Energy Daily, January 23. (Accessed December 10, 2008, at http://www.energy-daily.com/reports/General_Electric_Interested_In_Lithuania_Nuclear_Power_Plant_Project_999.html.)

Graham, Tod, 2006, Mazeikiu media frenzy, sale still up in smoke: The Baltic Times, November 1. (Accessed December 9, 2008, at http://www.baltictimes.com/print_article/16738/.)

Interfax Central Europe News Agency, 2007, Russian oil deliveries fundamental for Mazeikiu Nafta refinery—Lithuanian PM: Interfax Central Europe News Agency, April 23. 1 p. (Accessed December 8, 2008, at http://www.forum-ekonomiczne.pl/docs/Russian_oil_deliveries.pdf.)

Moldova.org, 2006, Yukos sells troubled Lithuanian refinery to Poland's Orlen: Moldova.org, December 14. (Accessed December 9, 2008, at http://economie.moldova.org/news/yukos-sells-troubled-lithuanian-refinery-to-polands-orlen-21596-eng.html.)

U.S. Energy Information Administration, 2006, Baltic Sea regional factsheet: U.S. Energy Information Administration, July. (Accessed December 8, 2008, at http://www.eia.doe.gov/emeu/cabs/Baltic/Oil.html.)

TABLE 1
ESTONIA, LATVIA, AND LITHUANIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Country and commodity		2002	2003	2004	2005	2006
ESTONIA[2]						
Cement:						
Clinker		169,800	157,300	113,100	88,800	65,100
Portland, other		465,900 r	506,200	614,600 r	726,000 r	848,900
Clays:						
For brick	thousand cubic meters	149,200	134,900	136,600	151,800 r	NA
For cement	do.	19,000	27,300	31,600	37,200 r	NA
Coal	thousand metric tons	12,401	14,896	13,989	14,588	14,188
Coke, electrode		30,000	30,000	35,600	38,700	40,000
Dolomite:						
For building	cubic meters	NA	291,200	323,400	261,700	NA
For finishing	do.	NA	3,200	1,300	2,000	NA
For industry (technological limestone)	do.	NA	150,800	171,900	155,300	NA
Fuel oil		301,800	317,600	338,500	367,400	389,200 p
Gravel, pebbles, shingle and flint	cubic meters	NA	NA	NA	597,100	NA
Lead, metal, secondary		NA r	NA r	3,000	7,000 e	9,000 e
Lime		32,000	31,000	34,000	37,000	39,700
Limestone:						
For building	cubic meters	NA	1,255,000	1,547,000	1,922,000	NA
For cement	do.	366,200	372,200	430,500	335,100 r	NA
For industry (technological limestone)	do.	NA	62,500	93,900	86,300	NA
Natural gas, dry	million cubic meters	NA	NA	NA	NA	1,456 p
Nitrogen, N content of ammonia		38,700	80,800	166,000	170,000	170,000 e
Oil shale	thousand metric tons	12,400	14,618 r	13,910 r	14,534 r	14,138
Peat	do.	1,519 r	1,089 r	769 r	1,034 r	1,196
For fuel	do.	626	534	418	490	585 p
Briquettes	do.	128	120	65	61	97 p
Rare-earth products[e]		3,000	3,000	3,000	3,000	3,000
Sand and gravel	thousand cubic meters	2,033	4,470	3,131	2,186 r	NA
Silica sand, industrial		22,500	41,300	49,800	53,800 r	38,000 e
Sulfur		NA	NA	NA	NA	NA

See footnotes at end of table.

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TABLE 1—Continued

ESTONIA, LATVIA, AND LITHUANIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Country and commodity		2002	2003	2004	2005	2006
LATVIA						
Cement		260,397	295,205	283,647	280,000	280,000 e
Crushed rock		NA	NA	NA	414,305	586,607
Gravel, pebbles, shingle and flint of a kind used for concrete aggregates; for road or for railway and other ballast		--	3,070,709	2,094,017	2,817,287	3,824,965
Gypsum		217,074	159,133	225,742	220,000 e	230,000 e
Limestone		393,285	431,590	443,987	420,000 e	NA
Natural gas, dry	million cubic meters	NA	NA	NA	NA	1,876 p
Peat		1,484,970	1,076,142	823,938	829,865 r	931,103
Sand and gravel		761,614	1,981,431	1,875,494	3,242,199 r	2,132,779
Silica sand, industrial[e]		50,000	50,000	50,000	50,000	50,000
Steel, crude		507,194	545,626	553,684	550,000 e	550,000 e
LITHUANIA						
Cement, portland, other		605,800	596,900	753,100	832,076 r	1,065,367
Clays		NA	240,800	228,100	289,500	385,300
Granules, chippings and powder of stones, excluding marble		NA	NA	NA	4,316	10,390
Limestone		984,300	944,600	1,385,600	1,242,200	1,776,300
Marble granules, chippings and powder		NA	NA	NA	666	1,167
Natural gas, dry	million cubic meters	NA	NA	NA	NA	2,884 p
Nitrogen, N content of ammonia		468,300	461,800	424,000	431,700	453,300
Peat		513,000	366,900	367,900	536,200 r	471,400
Petroleum:						
Crude		433,700	382,800	301,900	216,634 r	180,894
Refinery products		6,447,700	6,703,000	7,682,600	8,518,500	7,709,800
Sand and gravel:						
Construction sands		NA	NA	NA	3,689,217	4,342,743
Gravel, pebbles, shingle and flint		NA	NA	NA	3,345,185	3,290,568
Silica sand, industrial		63,000	49,700 r	58,300 r	46,500 r	42,600

[e]Estimated; estimated data are rounded to no more than three significant digits. [p]Preliminary. [r]Revised. NA Not available. -- Zero.

[1]Table includes data available through November 30, 2007.

[2]In addition to the commodities listed, Estonia produces niobium, sulfur, and tantalum, but available information is inadequate to derive estimates.

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THE MINERAL INDUSTRY OF FINLAND

By Harold R. Newman

Finland is an industrialized country whose economy was based on trade, primarily exports. The country imported metal concentrates from various sources to feed its smelters. The Government encouraged foreign investment in mineral exploration and exploitation. Both domestic and foreign companies were active in exploring for mineral resources, which included gemstones, hydrocarbons, industrial minerals, and metals.

Minerals in the National Economy

The potential of the Fennoscandian Shield to host undiscovered mineral deposits continued to attract international mining and exploration companies to Finland. The geologic similarity to the shield areas of Australia and Canada was one reason for the exploration interest. Further, the country's political and economic stability, the mining and environmental legislation, and the pro-mining attitude were important factors drawing exploration investment. Other positive factors included good infrastructure and the excellent quality and coverage of geodata by the Geological Survey of Finland. There appeared to be significant potential for new discoveries as the region had not been thoroughly examined for many commodities. The country's total expenditure on mineral exploration in 2006, including that by the Geological Survey of Finland, was about €40 million ($56 million),[1] which was the highest in Europe (Mining Journal Online, 2006).

Production

The mine output of copper, nickel, and zinc decreased in 2006 and production of crude steel and silver metal increased. Industrial minerals production remained about the same or increased. The five most important nonpetroleum minerals, by value, were chalk, coal, crushed stone, sand and gravel, and stone (Geological Survey of Finland, 2007). Data on mineral production are provided in table 1.

Structure of the Mineral Industry

Some 43 mines and quarries covered by the Finnish Mining Act were in production and produced about 20 million metric tons (Mt) of ore. The following four metal mines were in production: the Hitura nickel mine, the Kemi chromite mine, the Pahtaavaara gold mine, and the Pyhäsalmi copper-zinc mine. Carbonate rock was produced from 16 mines and quarries (Mining Journal Online, 2006).

The companies were mostly privately owned; the Government, however, held equity in some of the major mining companies. The industry operated on a free market basis. The country's mineral commodities, the companies that produce them, and the companies' annual capacities are listed in table 2.

Commodity Review

Metals

Cobalt and Copper.—Vulcan Resources Ltd. of Australia was a base-metals development and exploration company whose primary focus in 2006 was the completion of a feasibility study on its Kylylahti project located in eastern Finland; the project had an estimated resource of 7.8 Mt grading 0.24% cobalt, 1.17% copper, 0.22% nickel, 0.70 gram per metric ton (g/t) gold, and 0.49% zinc. Projected production during the expected 12 years of mine life was 600,000 metric tons per year (t/yr) of ore to produce 1,300 t/yr of cobalt, 9,000 t/yr of copper, 224 kilograms per year (kg/yr) of gold in concentrate, and 1,200 t/yr of nickel (Vulcan Resources Ltd., 2006a).

Gold.—Gold deposits occur in Finland in both Archaean and Proterozic domains, in all orogenic belts, and in nearly all possible geologic settings of the igneous-metamorphic terrains. The main gold provinces are the Archaean greenstone belts in eastern Finland, the Palaeoproterozoic Karelian greenstone belts in Lapland, and the Palaeoproterozoic Svecofennian schist belts in central and southern Finland. About 200 hard-rock gold occurrences were known. Large parts of Finland were still underexplored for gold. The Pahtavaara Mine, which was operated by Scanmining Corp., was the only producer of gold in 2006 (Geological Survey of Finland, 2006).

Agnico-Eagle Mining Ltd. announced plans to construct the Kittila gold mine on the Suurikuusikko deposit for $135 million. The Kittila Mine would initially be mined by an open pit method, and then by underground mining using ramp access. The mining operation would feed a 3,000 metric-ton-per-day (t/d) surface processing plant. The mine was expected to produce 4,200 kg/yr of gold. Production was expected to start by midyear 2008 and to continue for 13 years (Agnico-Eagle Mining Ltd., 2006).

Nickel.—In 2006, Norilsk Nickel of Russia, which was a world-ranked nickel producer, announced its plan to buy the nickel business of OM Group, Inc. (OMG) for $408 million in cash on a debt-free basis. OMG's assets included a nickel refining operation in Harjavalta, the Cawse nickel mining and leaching operations in Western Australia, and a 20% stake in MPI Nickel Pty. Ltd., which operated the Black Swan and the Silver Swan nickel mines that supplied nickel concentrate to the Harjavalta refinery. Through this transaction, Norilsk Nickel was continuing to expand its operations internationally and strengthen its position in the global mining and metals industry (Norilsk Nickel, 2006).

Scandinavian Minerals Ltd. announced that it had applied for a mining permit for its Kevitsa nickel-copper property. The permit application was based on an open pit operation that

[1] Where necessary, values have been converted from EU euros (€) to U.S. dollars ($) at the rate of €0.71=$1.00.

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would mine about 4.5 million metric tons per year (Mt/yr) of ore, with production of both nickel and copper concentrates. Scandinavian Minerals was also engaged in a metallurgical pilot plant project to optimize the metal grades and recoveries for production of smelter-grade nickel and copper concentrates (Scandinavian Minerals Ltd., 2006).

Vanadium.—Vulcan Resources Ltd. announced that it had acquired a major vanadium deposit and a number of vanadium prospects. The tenements encompass one former large iron-vanadium mine, Otanmaki, and are adjacent to the Mustavaara vanadium mine, which produced 10% of the world's consumption from the 1950s to the 1980s. Vulcan's Syote deposit is located 15 kilometers (km) from the Mustavaara Mine. Previous drilling had intersected vanadium-bearing magnetite gabbro horizons that were more than 130 meters (m) thick. Metallurgical testing produced a quality magnetite product with a grade of 1.78% vanadium oxide. Vulcan was to compile historical data, reassay the drill core, and reprocess magnetic data. Following completion of this work, a program of reconnaissance drilling would be undertaken to confirm the thickness and grade of the magnetite (Vulcan Resources Ltd., 2006b).

Mineral Fuels and Related Materials

Petroleum.—Neste Oil Corp.'s Porvoo oil refinery was an efficient and sophisticated refinery. Together with the refinery at Naantali, the company had a total refining capacity of 250,000 barrels per day. A new production line was completed at the Porvoo refinery. The new line would use residue oil to produce clean, sulfur-free motor fuels, particularly diesel fuel. Although the production of diesel fuel would increase, the overall capacity of the refinery would remain the same (Neste Oil Corp., 2006).

Uranium.—Agricola Resources plc, which was a uranium exploration company, completed initial drilling at the Hautajarvi deposit in northern Finland. The company reported that coring from two drill holes, HA 005 and HA 006, gave an average value of 0.33% uranium oxide (HA 005) and 0.19% uranium oxide (HA 006). Further drilling and geophysical studies would be done (Agricola Resources plc, 2006).

Mawson Resources Ltd. announced it had been granted five claim reservations covering three areas of known uranium mineralization in the north and east of the country. The Simonkorpi 1 claim is located within the Kuusamo Schist Belt, which is host to uranium occurrences and the Kouvervaara uranium deposit; the Saramaki 1 and 2 claim reservations are located in the Nilsia district of eastern Finland and cover a uranium mineralized boulder and outcrop trend that extends across 5 km. Fifteen uranium-bearing boulders and 25 uranium-bearing outcrops had been identified within the area. The host rock to the mineralization is an apatite-bearing gneiss. The Joensuunkyla 1 and 2 claim reservations are located in the Juuka district in eastern Finland within the principle uranium trend of the Paukkajanvaara sandstone-hosted uranium deposit. Fourteen uranium-bearing boulders and four uranium-bearing outcrops have been identified. The host rock to the mineralization is granite gneisss. Mawson had the sole right to apply for exploration claims in the area for 1 year, and exploration was allowed to be undertaken up to the point of ground disturbance (Mawson Resources Ltd., 2006).

Outlook

The operating environment in Finland was generally favorable for exploration and mining. It is expected to remain so. The country has a long mining history and a traditional focus on primary resources. The Geological Survey of Finland will continue to identify mineral deposits and compile geoscientific data. Mining and taxation laws are expected to remain favorable to the industry.

References Cited

Agnico-Eagle Mining Ltd., 2006, Agnico-Eagle to build Kittila gold mine in Finland: Quebec, Canada, Agnico-Eagle Mining Ltd. (Accessed June 5, 2006, at http://www.agnico-eagle.com/index.php.)

Agricola Resources plc, 2006, Assay results from drilling at Energy Ridge Hautajärvi area, Lapland County, northern Finland: Agricola Resources plc, January 9. (Accessed November 30, 2005, at http://www.agricolaresources.com/pressrelease09jan-b.html.)

Geological Survey of Finland, 2006, Gold in Finland: Espoo, Finland, Geological Survey of Finland, November 18. (Accessed January 22, 2007, at http://en.gtk.fi/ExplorationFinland/Commodities/ Gold.htm.)

Geological Survey of Finland, 2007, Mining and mineral production: Espoo, Finland, Geological Survey of Finland. (Accessed January 22, 2007, at http://en.gtk.fi/ExplorationFinland/Commodities/Gold.html.)

Mawson Resources Ltd., 2006, Mawson granted five uranium claims in Finland: Vancouver, British Columbia, Canada, Mawson Resources Ltd. press release, November 14, 1 p.

Mining Journal Online, 2006, Countries and commodities report—Finland: Mining Journal Online. (Accessed May 18, 2007, via http://www.mining-journal.com/registered/Annual_Review_Article.aspx?articleid=7380.)

Neste Oil Corp., 2006, Porvoo refinery: Kellaranta, Finland, Neste Oil Corp. (Accessed February 18, 2007, at http://www.nesteoil.com/default.asp.)

Norilsk Nickel, 2006, MMC Norilsk Nickel to acquire nickel business from OM Group for $408 million: Moscow, Russia, Norilsk Nickel. (Accessed February 7, 2007, at http://www.nornik.ru/en/press/news/2135.)

Scandinavian Minerals Ltd., 2006, Scandinavian Minerals applies for mining permit for Kevitsa nickel property: Toronto, Ontario, Canada, Scandinavian Minerals Ltd. (Accessed January 23, 2007, at http://www.cnrp.ccnmatthews.com/client/scandinaven_minerals/release.jsp?actionFor=627577.)

Vulcan Resources Ltd., 2006a, About Vulcan: West Perth, Australia, Vulcan Resources Ltd. (Accessed March 1, 2007, at http://www.vulcanresources.com.au/print.php?page=1.)

Vulcan Resources Ltd., 2006b Vulcan acquires world class vanadium opportunity: West Perth, Australia, Vulcan Resources Ltd. ASX release, March 1, 1 p.

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TABLE 1
FINLAND: PRODUCTION OF MINERAL COMMODITIES[1]

(Thousand metric tons unless otherwise specified)

Commodity[2]		2002	2003	2004	2005	2006
METALS						
Aluminum, metal, secondary	metric tons	31,076	32,619	39,266	34,127 r	35,773 3
Cadmium, metal, refined	do.	4	--	--	--	--
Chromite:e						
Gross weight:						
Lump ore		216	210	240	235	219
Concentrate		340	329	330	326	320
Foundry sand		10	10	10	10	10
Total		566	549	580 3	571 3	549
Cr_2O_3 content:						
Lump ore		75	76	84	82	80
Concentrate		125	125	127	126	125
Foundry sand		5	5	5	5	5
Total		205	206	216 3	213 3	210
Cobalt, metal, powder and salts	metric tons	4,292	4,574	5,246	6,158	5,903
Copper:						
Concentrate, gross weight	do.	50,494	50,875	52,864	51,319 r	44,663 3
Mine output, Cu content	do.	14,400	14,900	15,500	15,600 e	15,000 e
Metal:						
Smelter	do.	160,900	176,384	168,577	177,216	192,235
Refined	do.	127,136	135,160	132,133	124,994 r	136,674
Gold, metal, mine output	kilograms	4,666	5,409	6,222	3,747	5,292
Iron and steel, metal:						
Pig iron		2,828	3,092	1,042	3,056 r	3,158
Ferroalloys, ferrochromium		248	250 e	264	235	243
Steel, crude		4,004	4,766	4,833	4,738	5,052
Semimanufactures, rolled e		3,850	3,900	3,950	4,000	4,200
Mercury	kilograms	51,000	25,000	24,000	34,200 r	22,820
Nickel:						
Mine output, Ni content	do.	3,120 r	3,640 r	3,700 r	3,386 r	2,985
Metal, electrolytic	do.	49,151	45,417	40,088	34,709	42,299
Platinum	do.	508	461	705	678	1,000 e
Selenium, metal	do.	39,237	49,163	61,250	57,208	70,458
Silver, metal	do.	29,404	31,115	37,413	24,822	50,843 e
Zinc:						
Mine output, Zn content	metric tons	61,580	70,652	69,333	72,474	66,109
Metal	do.	235,337	265,853	284,524	281,905	282,238
INDUSTRIAL MINERALS						
Cement, hydraulic		1,198	1,493	1,628 r	1,537 r	1,684 3
Feldspar	metric tons	46,715	48,353	57,149	52,383 r	43,187 r
Lime		350	434	432	470 r	502
Mica	metric tons				9,473	8,097
Nitrogen, N content of ammonia	do.	87,000	77,100	60,600	73,592 r	91,356
Phosphate rock apatite concentrate:e						
Gross weight	do.	800	799	838	823 3	858 3
P_2O_5 content	do.	270	290	306	300 3	325 3
Pyrite, gross weight		727	677	702	489	495
Sodium sulfate		30	28	27	26	27
Stone, crushed:						
Limestone and dolomite:						
For cement manufacture		1,400 e	1,411	1,628	1,537	1,550 e
For agriculture		1,000 e	626	555	566	657
For lime manufacture		400 e	424	316	342	328
Fine powders		400 e	579	670	629	625 e
Metallurgical e		1	1	1	1	1
Total		3,200 e	3,041	3,170	3,075	3,161
Quartz silica sand		148	112	285	286	275

See footnotes at end of table.

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TABLE 1—Continued
FINLAND: PRODUCTION OF MINERAL COMMODITIES[1]

(Thousand metric tons unless otherwise specified)

Commodity[2]		2002	2003	2004	2005	2006
INDUSTRIAL MINERALS—Continued						
Sulfur:						
S content of pyrite		359	341	336	270 r,e	250 e
Byproduct:						
Metallurgy		308	305	301	300 e	300 e
Petroleum		55	60	65	70 e	70 e
Total		363	365	366	370 e	370 e
Sulfuric acid		951	1,036	1,141	1,057	1,276
Talc		416	460	492	508 r	547
Wollastonite	metric tons	20,000 e	17,300	16,763	15,950	16,200
MINERAL FUELS AND RELATED MATERIALS						
Peat:						
For fuel use		6,515	8,415	8,159	7,696	6,919
For agriculture and other uses		759	929	905	778	896
Petroleum, refinery products	thousand 42-gallon barrels	54,801	54,956	61,037	78,796	79,835

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. -- Zero.

[1]Table includes data available through December 2007.

[2]In addition to the commodities listed, granite and soapstone were produced, but available information is inadequate to make reliable estimates of output.

[3]Reported figure.

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TABLE 2
FINLAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Ammonia		Kemira Oyj (Government, 98%)	Plant at Oulu	75
Apatite		Kemira Agro Oy (Government, 98%)	Mine and plant at Siilinjarvi	8,000
Cadmium, metal		Outokumpu Oyj (Government, 40%, and private investors, 12.3%)	Smelter at Kokkola	1
Cement		Finncement Oy (Irish Cement Ltd., 100%)	Plants at Lappeenranta and Parainen	1,020
Chromite		Outokumpu Oyj (Government, 40%, and private investors, 12.3%)	Mine at Kemi	1,000
Copper:				
Ore, Cu content		Inmet Mining Corp.	Mines at Pyhasalmi, Saattopora, and Hitura	10
Metal		Outokumpu Oyj (Government, 40%, and private investors, 12.3%)	Smelter at Harjavalta	160
Do.		do.	Refinery at Pori	125
Feldspar		SP Minerals Oy (Partek Corp., 50.1%, and SCR-Silbeco SA, 49.9%)	Mine and plant at Kemio	50
Ferrochrome		Outokumpu Oyj (Government, 40%, and private investors, 12.3%)	Smelter at Tornio	250
Gold:				
Ore, Au content	metric tons	do.	Mine at Orivesi	4
Do.	do.	Scanmining	Pahtavaara Mine near Sodankyla	3
Metal	do.	Outokumpu Oyj (Government, 40%, and private investors, 12.3%)	Smelter at Pori	4
Limestone		Partek Nordkalk Oy (Partek Corp., 100%)	Mines at Lappeenranta, Pargas, and Parainen	1,500
Do.		Rauma-Repola Oy	Mine at Tornio	300
Mercury	metric tons	Outokumpu Oyj (Government, 40%, and private investors, 12.3%)	Smelter at Kokkola	150
Mica		Kemira Oyj (Government, 98%)	Mine at Siilinjarvi	10
Nickel:				
Ore, Ni content		Outokumpu Oyj (Government, 40%, and private investors, 12.3%)	Mine at Hitura	3
Metal		do.	Smelter at Harjavalta	32
Do.		OM Group, Inc.	Refinery at Harjavalta	50
Petroleum products	thousand barrels per day	Fortum Oil and Gas Oy	Plants at Naantali and Porvoo	250
Phosphate-apatite		Kemira Oyj (Government, 98%)	Mine at Siilinjarvi	700
Do.		Outokumpu Oyj (Government, 40%, and private investors, 12.3%)	Mine at Pyhasalmi	800
Quartz and quartzite		SP Minerals Oy (Partek Corp., 50.1%, and SCR-Silbeco SA, 49.9%)	Mines at Kemio and Nilsia	250
Selenium	metric tons	Outokumpu Oyj (Government, 40%, and private investors, 12.3%)	Smelter at Pori	35
Silver	do.	do.	do.	30
Steel:				
Crude		Rautaruukki Oy (Government, 41.8%)	Plants at Halikko, Hameenlinna, Kankaanpaa, and Raahe	2,100
Do.		Fundia AB (Norsk Jenverk AS of Norway, 50%, and Rautaruukki, 50%)	Plants at Aminnefors, Dalsbruk, and Koverhar	850
Do.		Ovako Oy (SKF, 50%; Wartsila, 25%; Fiskas, 20%)	Plant at Imatra	600
Stainless		AvestaPolarit	Plant at Tornio	550
Talc		Mondo Minerals Oy (BHP Billiton, 50%, and Plüss-Staufer AG, 50%)	Mines at Lahnaslampi, Lipsavaara, and Horsmanaho	500
Wollastonite		Partek Minerals Oy (Partek Corp., 100%)	Mine at Lappeenranta	30
Zinc:				
Ore, Zn content		Inmet Mining Corp.	Mine at Pyhasalmi	25
Metal		Outokumpu Oyj (Government, 40%, and private investors, 12.3%)	Smelter at Kokkola	260

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The Mineral Industry of France

By Walter G. Steblez[1]

France was a major European and world economy; its gross domestic product (GDP) in 2006 was valued at more than $1.9 trillion (based on purchasing power parity), and its GDP was the third largest in the European Union (EU) after Germany and the United Kingdom. The output value of France's industry accounted for about 20% of the GDP. The country was a major processor of mineral raw materials and a manufacturer of producer and consumer durable goods. France's heavy industries, which, among other product categories, produced machine tools, chemicals, and automotive and aviation products for domestic consumption and export, relied mainly on imported metal ores and concentrates, and on imported industrial minerals and mineral fuels (U.S. Central Intelligence Agency, 2007, p. 205).

Minerals in the National Economy

Owing to the size of France's economy, the upstream input of minerals was key to continued maintenance and growth of the country's heavy industries. In 2006, the value of crude material imports alone, which included ores and concentrates of metals and industrial minerals, base metals, and mineral fuels, amounted to almost 3% of the GDP (Eurostat, 2007, p. 1, 5).

Government Policies and Programs

The diminution of the role of the Government of France in the country's economy continued in 2006. Although the Government maintained total ownership of the postal, the transportation, and the tobacco growing and distribution sectors of the economy, the Government's total ownership of the country's natural gas and electricity production and distribution facilities ended with stock sales in 2005 and 2006. Earlier denationalization programs included the partial privatization of the country's automobile manufacturers and highway (toll-road) companies. The reduction of the Government's role in the economy was aimed at raising the competitiveness of and investment in France's economy; this policy was stimulated, in part, by the adoption of the euro (€), which increased competitive pressure on French companies (U.S. Department of Commerce, 2007a, b).

The Ministry of Ecology and Sustainable Development was responsible for overseeing and regulating such environmental issues as agricultural runoff; air pollution from industrial and vehicle emissions; forest damage from acidic rain; and the potential for water pollution from mining, mineral processing, and urban waste. To promote the innovation and assimilation of new technologies for sustainable commercial growth and development through public funding, the Government created the National Agency for Industrial Innovation (NAII) in June 2005. In 2006, the NAII allocated about €337 million ($445 million)[1] for research on technologies aimed at increasing energy efficiency, reducing CO_2 emissions, and raising the output of renewable raw materials. Research on sustainable mining and quarrying practices to assist municipalities in securing biodiversity, land, and water resources would be undertaken in France's Mediterranean region, at Crau/Camargue in the Rhone Delta, and in the vicinity of Marseille (Bio Intelligence Service SAS, 2006; Euro-Roc, 2007).

Production

In 2006, France's reported nickel output increased by about 9.3%, and that of hot-rolled steel, by 5.3%, compared with respective production levels in 2005. The production of zinc declined by an estimated 40%, and that of secondary lead declined by about 5% (table 1).

Major changes in the industrial mineral sector included sharp drops in the output of barite and fluorspar owing to mine closures. Also noted was a 49% decline in ammonia (nitrogen) production, and significant declines in chalk and pumice output. The production of salt increased by 39% compared with that of 2005 (table 1).

Mineral Trade

Most of France's needs for nonfuel and fuel mineral raw materials were met by imports. In 2006, France's imports of nonfuel crude materials, which included ores and concentrates of metals and industrial minerals, accounted for about 2% of total imports ($547 billion). Imports in this category from outside the EU were about 19% greater in value than those from EU-member countries. The major components of France's mineral trade in 2006 were net imports of mineral fuels, which constituted about 10.3% of the value of total imports. France's imports from the Commonwealth of Independent States (CIS), which included a major natural gas and petroleum component, amounted to more than $17 billion. France had a negative trade balance with the CIS that amounted to about $8.5 billion. France's imports from Russia alone amounted to more than $12.4 billion. France's negative trade balance with Russia amounted to more than $6.2 billion. In terms of volume, Russia accounted for about 13% of total French imports of petroleum; the CIS as a whole accounted for about 28%. Petroleum imports from within the EU were centered mainly in Norway and the United Kingdom, which together accounted for about 27% of France's crude petroleum imports in 2006. The Netherlands and Norway together accounted for about 45% of France's natural gas imports. Outside the EU, Russia accounted for more than 20% of France's imports of natural gas (Euro-Roc, 2007; Gambini, 2007; U.S. Energy Information Administration, 2007).

Structure of the Mineral Industry

Although France has maintained state monopolies in a number of sectors of the economy, state ownership of the mineral

[1]Deceased.
[2]Where necessary, values have been converted from EU euros (€) to U.S. dollars ($) at the rate of €1.00=$1.32.

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sector had substantially diminished by 2006. As noted earlier, the Government maintained partial ownership of the country's electricity generating and natural gas production and distribution capacities. Table 2 provides data on major French enterprises that produced metals, industrial minerals, and mineral fuels in 2006.

Commodity Review

Metals

Aluminum.—In 2006, France's total output of aluminum of was the same as that in 2005; net imports of aluminum metals and articles thereof amounted to more than $1.3 billion (table 1). France's Aluminium Pechiney, which was owned 100% by Alcan Inc. (Alcan), was the country's sole producer of primary aluminum. Alcan also operated facilities for the production of alumina and aluminum semimanufactures. Implementation of Alcan's decision in 2005 to close its smelter at Lannemezan was begun in mid-2006. The planned closure of the Lannemezan smelter, which was scheduled for completion by 2008, was based mainly on the expiration of long-term energy contracts and increasing energy costs (Alcan Inc., 2005, 2006b).

In 2006, Alcan's investment in France's aluminum sector included the acquisition of the remaining stock (70%) in cathode maker Carbone Savoie. The transaction, which was valued at $135 million, paralleled Alcan's planned investment of $70 million in 2007 for research and development (R&D) on smelter technology at the company's R&D facilities at Rhone-Alpes. Additional investment by Alcan included a planned outlay of about $9.5 million for the modernization of the continuous annealing and quenching line for automotive sheet and $15 million for new aluminum can splitting and trimming facilities at Neuf Brisach (Alcan Inc., 2006a, c, d).

Ferroalloys.—In 2006, major issues in France's ferroalloy sector concerned mainly the temporary closure of FerroPem's (part of FerroAtlántica Group, formerly Pechiney Électrométallurgie) silicon furnaces until March owing to high energy prices in the first months of the year (American Metal Market, 2006).

Iron and Steel.—France's output of pig iron and crude steel increased by 2.4% and 1.9%, respectively, compared with that of 2005 (table 1). Crude steel consumption during the 2001 to 2005 period (the latest years for which data were available) averaged slightly more than 18 million metric tons per year (Mt/yr); the consumption of finished steel averaged about 16.7 Mt/yr. The major event in the steel industry was the agreement reached in midyear to merge Acelor S.A. and Mittal Steel Company N.V. to form the world's leading steel producer. The initial value of Mittal's acquisition of Arcelor was set at $33.1 billion. Arcelor was created in 2002 through a merger of steel companies in France (Usinor Group), Luxembourg (Arbed S.A.), and Spain (Aceralia Corporacion Siderurgica S.A). Virtually all of France's steel sector was encompassed by the merger (Kanter and others, 2006).

Lead and Zinc.—In 2006, France's production of secondary lead declined by about 4.5% compared with that of 2005, but owing to the reportedly small amount of primary metal output, overall lead production fell by only about 1%. France's consumption of refined lead amounted to 207,025 metric tons (t), which was about 1.5% less than in 2005. Total slab zinc production in 2006 amounted to 120,000 t, which was a substantial decline of about 43% compared with that of 2005. France's zinc consumption in 2006 amounted to 249,244 t, which was a decline of about 8% compared with that of 2005. The decline in lead and zinc consumption was attributable, in part, to price increases of about 30% and 33% for lead and zinc, respectively, compared with 2005 prices; these price increases stemmed largely from continued growth of China's metals consumption and insufficient mine production capacity (table 1; Metaleurop, 2007; World Bureau of Metal Statistics, 2007, p. 90, 137).

Industrial Minerals

France produced a broad variety of industrial minerals, such as those listed in tables 1 and 2. In 2006, Imerys, which was a major French producer of industrial minerals, mined and processed ball clays, carbonates, feldspar, and red clays not only domestically but from deposits in such countries as China, Germany, Spain, the United States, and Vietnam for domestic use and export (Imerys, 2007, p. 8, 121).

Cement.—France's principal cement manufacturers were Lafarge S.A. and Société des Ciment Français (Ciments Français); apart from cement-producing facilities in France, both companies had major capital assets abroad. Ciments Français was a subsidiary of Italcementi S.p.A of Italy. The other important producers of cement in France were the Vicat Group, which had five plants with a total cement production capacity of 6 Mt/yr, and Ciments d'Origny, which had six plants and a total cement production capacity of 4.2 Mt/yr. In 2006, work continued on Lafarge's 300,000-metric-ton-per-year (t/yr)-capacity slag crushing plant at Bassens. Completion of the $26 million facility was scheduled for early 2007; it would deliver crushed slag by land and sea to cement plants at Deux-Severes and Haute Garonne (PR Newswire Europe Ltd., 2006; International Cement Review, 2003, p. 147).

Fluorspar.—The pending closure of the fluorspar mines in the Tarn region that was reported in 2005 was confirmed in 2006 with the announcement of a plan to auction off the Tarn region mines' equipment in midyear. The mines were owned and operated by Société Générale de Recherches et d'Exploitations Minières, which was a subsidiary of Alcan Inc. The closure of the mines was attributed to the depletion of reserves (Industrial Minerals, 2006).

Mineral Fuels and Other Sources of Energy

Of the total amount of primary energy consumed by France in 2006, 42.7% was electricity generated by hydraulic, nuclear, photovoltaic, and wind power facilities. Nuclear energy accounted for 42.7% of total energy consumption; petroleum, 33.4%; natural gas, 14.7%; coal, 4.5%; and other, 4.6%. Total primary energy consumption reached 275.3 million metric tons (Mt) of petroleum equivalent, which was a slight decrease (0.3%) compared with that of 2005. The production of electricity amounted to 574.5 terawatthours (Twh). Nuclear electric power stations contributed 450.2 Twh, thermal-electric power generated 60.5 Twh, and hydroelectric, wind, and photovoltaic power

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installations accounted for 63.8 Twh (Direction Générale de l'Énergie et des Matières Premières, 2007, p. 1, 9).

Coal.—Domestic coal production ceased in 2005; this loss was compensated for mainly by imports of solid mineral fuels. In 2006, coal constituted 93% of solid mineral fuel imports, which was an increase of 2.2% compared with that of 2005. Australia, Colombia, the EU, South Africa, and the United States were the leading suppliers of coal to France. Owing to rising energy prices, state-owned coal producer Charbonnage de France was considering reopening coal mines (provided that strict clean coal technologies are utilized). Some discussion centered on the construction of a coal mine–thermal electric power-generating complex at Lucenay-les-Aix in central Burgundy. Reportedly, the proposed complex would rely on 70 Mt of coal reserves and supply feedstock to a 1,000-megawatt electric power station (Carlisle, 2006; Direction Générale de l'Énergie et des Matières Premières, 2007, p. 7).

Natural Gas and Petroleum.—In 2006, France's domestic production of natural gas and petroleum showed mixed results compared with the output of these commodities in 2005. Natural gas output increased by about 9%, which followed a substantial production decline in 2005 that stemmed from facility downtime for scheduled 5-year maintenance at the Lacq gasfield and processing facility. Domestic petroleum production declined by about 2% compared with that of 2005. In 2006, rising oil prices prompted a 27% outlay increase for exploration; drilling increased by 59% to about 4,600 meters (Carlisle, 2006).

The privatization of Gaz de France and its merger with the Belgian-French Suez Group was among the main developments in the energy sector in 2006. The privatization and merger received the approval of the EU and the Government. The agreement called for the reduction of the Government's stake in Gaz de France to 34% from about 80% and the divestiture of several gas and electricity distribution subsidiaries by each of the merging parties. To diversify sources of natural gas, Gaz de France announced plans in early 2006 to invest about $1.8 billion in two natural gas pipelines; one would connect Europe with Algeria by 2007; the other would connect Europe with Iran by 2015 (Alexander's Gas & Oil Connections, 2006; European Commission, 2006).

In midyear, a natural gas pipeline that connected the Basque regions of France with Spain was put into operation. The 28-kilometer Euskadour pipeline was designed with a gas-carrying capacity of about 500 million cubic meters per year (Petroleum Economist, 2006).

Nuclear Energy.—In 2006, nuclear energy accounted for 78.4% (450.2 Twh) of total electric power, which was a slight decline (-0.3%) compared with that of 2005. At yearend 2006, the EU and a consortium of countries that included China, India, Russia, and the United States reached an agreement to build an experimental $5.77 million fusion reactor at Cadarche in France (Platts, 2006; Direction Générale de l'Ènergie et des Matierès Premierès, 2007, p. 9).

Outlook

France is expected to continue to rely on imported mineral raw materials, including mineral fuels, to produce consumer and producer durables and such intermediate products as ferrous and nonferrous metals and semimanufactures, construction materials, and chemicals.

References Cited

Alcan Inc., 2005, Alcan to begin progressive closure process of Lannemezan Aluminium Smelter: Montreal, Quebec, Canada, Alcan Inc. press release, October 13, 2 p.

Alcan Inc., 2006a, Alcan completes acquisition of cathode business in France: Montreal, Quebec, Canada, Alcan Inc. press release, December 12, 2 p.

Alcan Inc., 2006b, Alcan facts: Montreal, Quebec, Canada, Alcan Inc. brochure, 20 p.

Alcan Inc., 2006c, Alcan launches breakthrough aluminum technology initiative in France: Montreal, Quebec, Canada, Alcan Inc. press release, December 14, 2 p.

Alcan Inc., 2006d, Alcan to invest US$9.5 million for automotive sheet upgrade at Neuf Brisach plant in France: Paris, France, Alcan Inc. press release, December 11, 2 p.

Alexander's Gas & Oil Connections, 2006, Gaz de France to invest $1.8 bn in pipelines linking Europe to Algeria: Limbach, Germany, Alexander's Gas & Oil Connections press release, v. 11, no. 7, April 5, 1 p.

American Metal Market, 2006, Ferroaltlantica keeps French operations shut: New York, New York, American Metal Market, v. 114, no. 6-2, February 14, p. 7.

Bio Intelligence Service SAS, 2006, Environmental technologies action plan—French Agency for Industrial Innovation: Ivry sur Seine, France, Bio Intelligence Service SAS press release, November, 1 p.

Carlisle, Charles, 2006 European coal mining revival: Johannesburg, South Africa, Mineweb, August 8, 1 p.

Direction Générale de l'Énergie et des Matierès Premières, 2007, Bilan energetique de l'annee 2006 de la France: Paris, France, Ministére de l'Èconomie des Finances et de l'Industrie, April 5, 25 p.

European Commission, 2006, Mergers—Commission approves merger of Gaz de France and Suez, subject to conditions: Brussels, Belgium, European Commission press release, IP/06 1558, November 14, 2 p.

Euro-Roc, 2007, EU technology platform on sustainable mineral resources—Priority project area 2—Community relations: Brussels, Belgium, Euro-Roc, August 22, 4 p.

Eurostat, 2007, Comext: Brussels, Belgium, European Community, Comext, March 3, 448 p.

Gambini, Gilberto, 2007, Statistics in focus—External trade: Brussels, Belgium, Eurostat, no. 114, 7 p.

Imerys, 2007, Annual report 2006: Paris, France, Imerys, 278 p.

Industrial Minerals, 2006, Sogerem auctions fluorspar assets: London, United Kingdom, Metal Bulletin, no. 465, p. 15.

International Cement Review, 2003, Global cement report, 5th edition: Surrey, United Kingdom, International Cement Review, 341 p.

Kanter, James, Timmons, Heather, and Giridharadas, Anand, 2006, Arcelor agrees to Mittal takeover: Paris, France, International Herald Tribune, July 7, p. 1-3.

Metaleurop, 2007, 2006 results—2007 outlook: Paris, France, Metaleurop company report, May 30, 6 p.

Petroleum Economist, 2006, France-Spain: London, United Kingdom, Petroleum Economist, v. 73, no. 8, August, p. 40.

Platts, 2006, Six countries, EU to sign ITER agreement November 21: Columbus, Ohio, Platts press release, November 20, 1 p.

PR Newswire Europe Ltd., 2006, Lafarge invests to keep pace with market growth and strengthen its position in cement: London, United Kingdom, PR Newswire Europe Ltd. press release, December 15, 2 p.

U.S. Central Intelligence Agency, 2007, France, *in* World factbook: Washington DC, U.S. Central Intelligence Agency, 699 p.

U.S. Department of Commerce, 2007a, France—Economic trends and outlook: U.S. Department of Commerce, 3 p.

U.S. Department of Commerce, 2007b, France—Investment climate statement: Washington DC, U.S. Department of Commerce, 12 p.

U.S. Energy Information Administration, 2007, France: U.S. Energy Information Administration country analysis brief,, April, 10 p.

World Bureau of Metal Statistics, 2007, World metal statistics: Hertfordshire, United Kingdom, World Bureau of Metal Statistics, October, 150 p.

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TABLE 1
FRANCE: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2002	2003	2004[e]	2005[e]	2006[e]
METALS						
Aluminum:						
Bauxite, gross weight[3]	thousand metric tons	170	168	160 [4]	168	168 [4]
Alumina, metallurgical, gross weight[3]	do.	400 [e]	300 [e]	300	200	200
Metal:						
Primary	do.	463	445	451 [4]	442 [4]	442 [4]
Secondary	do.	262	240	236 [4]	222 [4]	222 [4]
Antimony, metal, including regulus[e]		500	500	500	500	500
Cadmium metal		63	120 [r]	100 [r]	100 [r]	100
Cobalt, metal:						
Powder[e]		500	500	500	500	500
Chloride		175	181	191 [4]	191 [4]	190 [4]
Copper, metal, secondary, refined[e]		500	--	--	--	--
Gold, mine output, Au content	kilograms	1,724	1,470	1,312 [4]	1,500 [r]	1,500 [4]
Iron and steel:						
Metal:						
Pig iron	thousand metric tons	13,217	12,756	13,198 [r]	12,705 [r]	13,013 [4]
Ferroalloys, electric furnace:[e]						
Ferromanganese	do.	130	120	106	105 [r]	105
Ferrosilicon	do.	100	100	87	100	100
Silicomanganese	do.	50	107	64	65	60
Silicon metal	do.	75	75	75	75	85
Other	do.	65	65	65	65	60
Total	do.	420	467	397	415	410
Steel:						
Crude	do.	20,524	19,803	20,770 [r,4]	19,481 [r,4]	19,857 [4]
Hot-rolled	do.	18,561	18,400	17,376 [r,4]	16,566 [r,4]	17,437 [4]
Lead:						
Smelter, secondary		105,000	-- [e]	-- [4]	-- [4]	-- [4]
Refined:						
Primary		83,575	1,535	--	--	4,039
Secondary		111,643	96,155	105,600 [4]	104,979 [r,4]	100,195 [4]
Total		195,218	97,690	105,600	104,979 [r,4]	104,234 [4]
Nickel, refinery products, Ni content[5]		11,440	11,138	12,103 [r]	12,536 [r,4]	13,700 [4]
Silver:[e]						
Mine output, Ag content	kilograms	709 [r]	495 [r]	682 [r]	700 [r]	700
Metal, Ag content of final smelter products	do.	400	400	400	400	400
Tin, secondary		1,600	1,500	1,500	1,500	1,500
Zinc metal, including slab and secondary		338,924	268,408	267,528 [4]	210,000	120,000 [4]
INDUSTRIAL MINERALS						
Abrasives, undifferentiated[e]		300	300	300	300	272
Barite, $BaSO_3$ equivalent[e]		80,000	81,000	75,000 [r]	75,000 [r]	30,000
Cement, hydraulic	thousand metric tons	19,450	19,660	20,960 [4]	21,277 [r]	21,000
Clays:						
Kaolin and kaolinitic clay (marketable)	do.	339	323	316 [4]	293 [r]	300
Refractory clay, unspecified[e]	do.	15	15	15	15	15
Diamond, synthetic, industrial[e]	thousand carats	3,600	3,600	3,600	3,600	3,600
Diatomite[e]	thousand metric tons	80	80	75	75	75
Feldspar, crude	do.	659	671	628 [4]	651 [r,4]	650
Fluorspar, marketable	do.	105	89	90	53 [r]	40
Gypsum and anhydrite, crude[e]	do.	4,500	3,500	3,500	3,500	3,500
Kyanite, andalusite, related materials[e]	do.	65	65	65	65	65
Lime, quick and hydrated, dead-burned dolomite[e]	do.	3,500 [r]	3,500 [r]	3,600 [r]	3,400 [r]	3,500
Mica[e]		17,000 [r]	18,000 [r]	19,000 [r]	20,000 [r]	20,000

See footnotes at end of table.

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TABLE 1—Continued
FRANCE: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2002	2003	2004[e]	2005[e]	2006[e]
INDUSTRIAL MINERALS—Continued						
Nitrogen, N content of ammonia	thousand metric tons	1,172	1,153	1,120 [4]	1,206 [r]	616
Phosphates, Thomas slag[e]	do.	50	50	50	50	50
Pigments, mineral, natural, iron oxide[e]		1,000	1,000	1,000	1,000	1,000
Potash, K_2O equivalent (marketable)	thousand metric tons	139	-- [e]	--	--	--
Pumice and other natural abrasives	do.	400	400	400	400	272 [4]
Salt, all sources	do.	6,807	6,673	6,910	6,730	9,371 [4]
Sodium compounds:[e]						
Soda ash	do.	1,000	1,000	1,000	1,000	1,000
Sodium sulfate	do.	120	120	120	120	120
Stone, sand and gravel:[e]						
Chalk	do.	700	700	700	673 [4]	554 [4]
Dolomite, crude	do.	1,000	1,000	1,000	974 [4]	991 [4]
Granite, crude	do.	300	300	300	255 [4]	245 [4]
Limestone, agricultural and industrial	do.	12,000	12,000	12,000	11,590 [r,4]	11,018 [4]
Marble and travertine, crude	do.	200	200	200	121 [4]	130 [4]
Sandstone	do.	35	35	35	33 [4]	32 [4]
Slate, crude		5,000	5,000	5,000	5,390	5,703
Sand and gravel:						
Industrial sands		5,179	5,089	5,242 [4]	5,200	5,200
Other sand, gravel, and aggregates		166,788	160,884	163,404 [4]	165,000	165,000
Sulfur, all sources		1,016	1,012	965	616 [r]	650
Talc, crude	thousand metric tons	359 [r]	394 [r]	402 [r]	416 [r]	420
MINERAL FUELS AND RELATED MATERIALS						
Asphaltic material[e]		20,000	20,000	20,000	20,000	20,000
Carbon black[e]		200,000	200,000	200,000	200,000	200,000
Coal, including briquets:						
Anthracite and bituminous	thousand metric tons	1,483	1,730	160 [4]	--	--
Lignite	do.	148	9	--	--	--
Total	do.	1,631	1,739	160 [4]	--	--
Briquets[e]	do.	175	175	100	100	100
Coke, metallurgical	do.	4,552	4,601	4,616 [4]	4,500	4,500
Gas, natural, marketed	million cubic meters	1,750	1,520	1,330 [4]	1,100 [r]	1,200
Petroleum:						
Crude	thousand 42-gallon barrels	9,825	9,150	8,550 [4]	7,775 [4]	7,604 [4]
Refinery products:						
Liquefied petroleum gas	do.	26,901	33,617	32,000 [4]	32,000	30,000
Gasoline, all kinds	do.	128,115	143,263	140,000 [4]	140,000	140,000
Kerosene and jet fuel	do.	41,428	41,356	42,000 [4]	42,000	45,000
Distillate fuel oil	do.	245,645	261,340	250,000 [4]	250,000	250,000
Residual fuel oil	do.	66,357	70,847	72,594 [4]	72,600	70,000
Other products[e]	do.	118,698	127,166	129,000 [4]	129,000	130,000
Refinery fuel	do.	34,128	34,419	35,000 [4]	35,000	35,000
Total	do.	661,272	712,008	700,594 [4]	701,000	700,000
Uranium, chemical concentrate, U_3O_8 equivalent		12	--	--	--	--

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. -- Zero.
[1]Table includes data available through September 2007.
[2]In addition to the commodities listed, France produces germanium from domestic ores, but actual output is not regularly reported.
[3]Reprocessed bauxite not for metallurgical use.
[4]Reported figure.
[5]Excludes secondary production from nickel/cadmium batteries.

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TABLE 2
FRANCE: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Alumina, metallurgical		Aluminium Pechiney (Alcan Inc., 97.95%)	Plant at Gardanne	200
Aluminum		do.	Aluminum smelters at:	
Do.		do.	Saint-Jean-de-Maurienne, Savoie Province	120
Do.		do.	Nogueres, Pyrenees, Atlantiques Province	115
Do.		do.	Lannemezan, Hautes-Pyrenees Province	63
Do.		do.	Auzat, Arieege Province (closed)	50
Do.		Aluminium Dunkerque (Alcan Inc., 97.95%)	Dunkerque, Calais du Nord	250
Andalusite		Denain-Anzin Minéraux Réfractaire Céramique	Glomel Mine, Brittany	75
Antimony, metal		Produits Chimiques de Lucette	Plant at Le Genest, Mayeene Province	15
Barite		Barytine de Chaillac	Mine and plant at Chaillac, Indre Province	150
Do.		Société Industrielle du Centre	Mine at Rossigno, Indre Province	100
Cadmium	metric tons	Compagnie Royale Asturienne des Mines	Plant at D'Auby-les-Douai, Nord Province	200
Cement		Four companies, the largest of which are:	80 plants, including:	26,700
Do.		LaFarge S.A.	13 plants; largest at St. Pierre-la-Cour (1,160)	9,500
Do.		Société des Ciment Français	13 plants; largest at Gargenville (1,100)	7,000
Clay, kaolin		La Source Compagnie Minière	Kaolin d'Arvor Mine, Quessoy	300
Coal		Charbonnages de France (CdF), including:		
Do.		Centre-Midi Bassin	Open pit mines (closed)	1,000
Do.		Lorraine Bassin	Underground mines (closed)	2,500
Cobalt, metal	metric tons	Société Métallurgique le Nickel (SLN)	Plant at Sandouville, near Le Havre	600
Copper, metal		Compagnie Générale d'Électrolyse du Palais	Electrolytic plant at Palais-sur-Vienne	45
Do.		Société Française d'Affinage du Cuivre	Smelter at Poissy, Yvelines	11
Diatomite		Ceca S.A.	Mines and plants at Riom-les-Montagnne and St. Bauzille	100
Feldspar		Denain-Anzin Mineraux S.A. (Imerys Group)	Mine and plant at St. Chely d'Apcher	55
Ferroalloys		Comilog International	Plant at Boulogne-sur-Mer	500
Do.		Société du Ferromanganese de Paris, Outreau	do.	420
Do.		FerroPem (Ferroatlantica)	Plants at Bellegarde, Laudun, and Marignac	400
Fluorspar		Société Génerale de Recherches et d'Exploitation Minières (Alcan Inc.)	Mines in southern France	150
Gold	kilograms	Mines d'Or de Salsigne (Eltin Co., 51%; Ranger Co., 18%; Peter Hambro Plc., 10%)	Salsigne Mine near Carcassonne (closed)	3,000
Gypsum		S.A. de Matériel de Construction	Mine at Taverny	1,500
Iron and steel, steel		Sollac Atlantique S.A. (Acelor Group)	Dunkerque	6,700
Do.		do.	Fos-sur-Mer	4,200
Do.		do.	Florange	3,200
Do.		Sollac Unimetal (Usinor Group, 100%)	Gadrange, Neuves Maisons, and Thonville	8,400
Lead, metal		Metaleurop Nord (Metaleurop S.A.)	Plant at Noyelles Godault (closed)	165
Magnesium, metal		FerroPem	Plant at Marignac (closed)	15
Mica		Denain-Anzin Minéraux S.A. (Imerys Group)	Mine at Ploemeur, Brittany	160
Natural gas	million cubic meters	Société Nationale Elf Aquitaine (SNEA)	Gasfield and plant at Lacq	20,000
Nickel, metal		Société Métallurgia le Nickel (SLN)	Plant at Sandouville	16
Nitrogen, N content of ammonia		Grande Paroisse S.A.	Plant at Grandpuits	390
Petroleum:				
Crude	42-gallon barrels per day	Société National Elf Aquitaine (SNEA)	Paris Basin oilfields	1,000
Refined	do.	Total S.A.	Refineries at Gonfreville and La Mede	446,000
Do.		Shell-Française	Refinery at Petite Couron	285,000
Do.		do.	Refinery at Berre	270,000
Do.		Société Nationale Elf Aquitaine (SNEA)	Refinery at Feyzin	120,000
Do.		do.	Refinery at Donges	200,000
Do.		do.	Refinery at Grandpuits	96,000
Do.		Société Française British Petroleum (S.F.B.P.)	Refineries at Lavera	175,000
Do.		Esso S.A.	Refineries at Fos-sur-Mer	237,000
Do.		Mobil Oil Française	Refineries at Gravenchon	62,000
Do.		Cie. Rhenane de Raffinage (CRR)	Refinery at Reichstett	80,000

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TABLE 2—Continued
FRANCE: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Potash, K_2O		Mines de Potasse d'Alsace S.A. (MDPA)	Amelie and Marie-Louise mines in Alsace (closed)	2,500
Salt		Compagnie des Salins du Midi et des Salines de l'Est (Salins Group)	Mines and plants at Algues Mortes, Dax, Salin de Girad, and Varangeville	2,500
Sulfur		Société Nationale Elf Aquitaine (SNEA)	Byproduct from natural gas, Lacq plant	3,000
Talc		Talc de Luzenac S.A. (Rio Tinto Corp., 100%)	Trimouns Mine near Ariege, Pyrenees	350
Uranium, U_3O_8	metric tons	Compagnie Général des Matières Nucléaires (Areva S.A.)	Mines at Limousin, Vendee, and Herault (closed)	1,800
Zinc, metal		Umicore Group	Plants at Auby-les-Douai and Calais	220
Do.		Metaleurop Nord (Metaleurop S.A.)	Plant at Noyelles Godault (closed)	110

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THE MINERAL INDUSTRY OF GERMANY

By Steven T. Anderson

In 2006, Germany was a leading global exporter of industrial goods and services (including processed and fabricated mineral products). The country's mineral industry, however, depended almost entirely on imported mineral raw materials. Germany was the leading producer of lignite in the world, but domestic production provided only enough mineral fuel to account for 11% of total primary energy consumption in the country. Germany was dependent on imports of other mineral fuels for almost all the remainder of its primary energy consumption; renewable energy resources, such as wind power, accounted for only about 1% of total energy consumption. In addition to imports of mineral fuels, Germany's metal processing sector relied on imports of metal ores and concentrates because no metals were mined domestically. The country did possess considerable reserves of many industrial minerals, however.

Germany produced greater than 1% of total world production of aluminum, barite, bentonite, bromine compounds, cadmium (secondary), cement, diatomite, feldspar, gallium, gypsum, kaolin, crude iron, lime, magnesium compounds (as byproducts of potash mining), nitrogen (ammonia), potash, industrial quartz, salt, selenium (as a byproduct of copper refining), silica (industrial sand and gravel), crude steel, and sulfur. In addition, Germany's domestic mineral processing sector accounted for at least 5% of the world's total production capacity of alumina, fused aluminum oxide, graphite, magnesium metal (secondary), rhenium metal (byproduct), strontium compounds, and titanium dioxide pigments.

The international competitiveness of the country's nonfuel mineral processing and fabrication sectors relied primarily on such factors as a highly skilled labor force, rapid assimilation of new technology (especially metal and other mineral materials recycling technologies), and the development and maintenance of liberal trade relationships both within and outside of the European Union (EU), which officially expanded to 27 members at the end of 2006. Throughout the year, rising global demand for mineral fuels and associated price increases for imports of mineral fuels into Germany had a significant effect on the operating costs of the country's mineral industry. Additionally, rapid development of mineral processing operations in economically less-developed or lower-cost (for mineral extraction, processing, and transportation) regions of the world placed increased pressure on the mineral industry to minimize energy, labor, and material costs within the country. Germany was the leading producer of salt (NaCl), kaolin, and potash in the 27-member EU and was the second, third, and fourth ranked producer of these commodities, respectively, in the world. The country was also a leading producer of barite, bentonite, crude gypsum, and feldspar in the EU. Germany's metal processing sector was the leading producer of aluminum metal, refined copper, and crude steel in the EU and the EU's second ranked producer of refined lead and zinc metal (Bundesanstalt für Geowissenschaften und Rohstoffe, 2006, p. 138, 150, 155, 157, 159, 161, 165; Statistik der Kohlenwirtschaft e.V., 2007; Statistisches Bundesamt, 2007, p. 12; U.S. Library of Congress, Federal Research Division, 2007, p. 10).

Minerals in the National Economy

In 2006, the output of the metal processing sector (up until the foundry stage of production) was valued at about $85.7 billion[1] compared with $69.6 billion in 2005, and these values accounted for 3.7% and 3.1% of the annual gross domestic products (GDPs), respectively. Most of this increase was accounted for by an increase in price of the metals produced. The German Federal Statistics Office (DSTATIS)'s real (based upon prices in 2000) producer's price index for all of the metals and alloys produced in the country increased by about 12.6%. The cost of metals contained in ores and concentrates also increased, and Germany spent about $32.3 billion on imports of crude metallic mineral materials in 2006 compared with $21.7 billion in 2005. Domestic mine production of nonfuel industrial minerals (excluding manufactured products, such as cement) was valued at approximately $3.86 billion in 2006 compared with $3.52 billion in 2005, although the real producer's price index increased by only slightly more than 1% (Bundesanstalt für Geowissenschaften und Rohstoffe, 2007, p. 21-22, 27-29; Statistisches Bundesamt, 2007, p. 10, 12, 15).

Although an official value of domestic coal mine production was not readily available, an estimate can be obtained by using the annual average price per metric ton (t) of coal equivalent (CE) contained in anthracite and bituminous (hard) coal, and of lignite consumed for domestic energy generation. Using this method, the value of mine production of lignite was approximately $7.0 billion in 2006 compared with $6.7 billion in 2005, although the volume of production decreased slightly. Domestic production of hard coal products (other than coking coal, which was valued at about $131 per metric ton of CE in 2006 compared with $78 per metric ton of CE for other hard coal products) was valued at about $1.7 billion in 2006 compared with $2.1 billion in 2005, and annual production levels continued to decrease. DSTATIS's producer's price index for all coal types (including the price of peat for mineral fuel usage) actually increased by about 4% in 2006 compared with that of 2005 (table 1; Statistik der Kohlenwirtschaft e.V., 2007; Statistisches Bundesamt, 2007, p. 9-10).

The recovery of metallic mineral raw materials exclusively from secondary sources (scrap metal) contributed about $3.2 billion to the GDP in 2006 compared with $2.2 billion in 2005, and that of industrial mineral raw materials (including from mineral-rich slags and residues) was valued at about $1 billion in 2006 compared with $0.9 billion in 2005. DSTATIS's real producer's price index for all secondary metals and industrial minerals increased by about 18% in 2006 compared

[1]Where necessary, values have been converted from European Union euros (€) to U.S. dollars (US$) at an annual average exchange rate of €0.8027=US$1.00 for 2005 and €0.7964=US$1.00 for 2006. All values are nominal, at current prices, unless otherwise stated.

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with that of 2005. Primarily owing to this increase in scrap prices (which was even greater in nominal terms), Germany spent about $22 billion on imports of scrap metal in 2006 compared with $12 billion in 2005, and the country earned about $10 billion from exports of scrap metal during 2006 compared with $6.7 billion in 2005. Reliable data on the volume of scrap mineral materials produced was not available at the time of this writing (International Monetary Fund, 2007; Statistisches Bundesamt, 2007, p. 10, 17; 2008, p. 68, 72).

Approximately 1,260 metal-processing plants were operating in Germany in 2006, of which about 70 were focused exclusively on the recovery of metals from secondary sources. In 2005 (the latest year for which reliable statistics were available), 29,273 people were employed in underground mining (20,359 of which mined anthracite and bituminous coal) and 15,277 people were employed in open pit mining and quarrying (of which about 10,000 were employed in mining lignite). An additional 50,389 people were employed above ground to provide full-time administrative, clerical, and logistical support for domestic mining operations. The German Raw Materials and Mining Union defined the mineral raw materials industry to include mineral processing up until the foundry stage and the generation of electricity from mineral fuels (in addition to mining). Under this definition, the mineral industry employed more than 1.2 million people in 2005, which accounted for about 3.6% of the total number of full-time employees in the country (Vereinigung Rohstoffe und Bergbau e.V., 2006; Bundesministerium für Wirtschaft und Technologie, 2007, p. 76; Statistisches Bundesamt, 2007, p. 15).

Government Policies and Programs

Germany's main mining law is the Federal Mining Act (BGBl. IS. 1310), which was approved on August 13, 1980, and revised on December 9, 2006, through slight revision to provisions of Article 11 (BGBl. IS. 2833). The 2006 revision was not expected to have much effect on the structure of the mineral industry. Of greater structural impact was the continued phasing out of the subsidy for the mining of anthracite and bituminous coal (hard coal), which was scheduled to be completely eliminated by 2018. In 2006, the total amount of this subsidy was about $3.3 billion. A Government review of this phaseout policy was scheduled for 2012, which coal mining interests in the country expected to represent the last date for approval of a possible extension of the 2018 deadline. Although these lobbying groups considered the probability of such an extension to be quite low, they believed that coal prices could increase substantially or that a global coal shortage could help create economic circumstances that would make it possible for industry to continue to mine hard coal from at least a few of the remaining mines in the country. It was also thought that private steel companies might help finance the mining of coking coal, even after the end of Government subsidies (Bundesministerium der Justiz, 2007, p. 1; Bundesministerium für Wirtschaft und Technologie, 2007, p. 34-36; Casteel, 2007, p. 4; Whitlock, 2007).

In 2006, the Federal Ministry of Economics and Technology (BMWi) claimed that the German mining law applies uniformly to all important mineral resources in the country and is comprehensive in the sense that it covers all aspects of mining (such as health and safety and environmental aspects). Nonetheless, the BMWi expressed a desire to cooperate with the European Commission (EC) to continue to develop EU legislation (directives) to provide a more uniform regulation of the extractive industries throughout the EU. Through the end of 2006, the EU still had no comprehensive European mining legislation; the BMWi believed, however, that many EU directives (some of which were still in the proposal stage), were already having (or could have) a direct impact on domestic implementation of German mining law. Some examples include the following:

- Directive 94/22/EC concerning the conditions for granting and using authorizations for the prospection, exploration, and production of hydrocarbons;
- Directive 92/91/EEC concerning the minimum requirements for improving the safety and health protection of workers in the mineral-extracting industries through drilling;
- Directive 92/104/EEC on the minimum requirements for improving the safety and health protection of workers in surface and underground mineral extracting industries; and
- A proposal for an EU directive on the management of waste from the extractive industries (Kullmann, 2007).

There is no single, easily identifiable mining investment law in Germany, although the process for investing in the German mineral industry is unique in some ways. Most importantly, the corporate sector in Germany relies almost exclusively on bank credit (loans) to fund investment instead of issuing securities to the public through market exchanges. This is especially true for small- and medium-scale enterprises (SMEs), which account for the majority of companies invested in the mineral industry of Germany. A foreign company usually has to register a GmbH (private limited-liability company) subsidiary in the country to obtain the same legal benefits as a domestic company. These benefits include Government investment grants, tax benefits, and low-interest loans or bank loans with a state guarantee. These benefits are greater for companies that export (Economist Intelligence Unit Ltd., The, 2007; World Tax Inc., 2007).

A tax reform package that was launched in 2002 to eliminate a prohibitively high capital gains tax on the sale of shareholdings by companies in Germany was viewed in 2006 as helping to weaken the traditionally close relationship between companies and banks because it increased the willingness of companies to access the capital market directly. This was true mostly for only the larger companies, however, and SMEs continued to rely on bank credit for financing. Capital investment by SMEs was almost entirely financed by public-sector banks (locally owned savings banks and state banks) and cooperative banks. [The large number of public banks in Germany is considered unique among highly developed (economically) countries; these banks were originally created to facilitate rapid reconstruction (including playing a vital role in the redevelopment of the coal and steel production sectors of the mineral industry) after World War II.] The German Government had reached an agreement with the EC in 2001 to phase out Government guarantees for the commercial activities of public banks by July 2005, which, in 2006, caused consolidation among public banks. The German Government was concerned that this consolidation would reduce

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access to credit for SMEs, but a study by Deutsche Bundesbank found that public bank consolidation had not significantly reduced SMEs' access to credit through 2006 (Casteel, 2007, p. 2; Economist Intelligence Unit Ltd., The, 2007; Marsch and others, 2007, p. 2; World Tax Inc., 2007).

A new Environmental Impact Assessment Act (EIA Act) (BGBl. IS. 1757, 2797), which was approved on June 25, 2005, and revised through slight changes to Article 2 (BGBl. IS. 3316) of the act on December 21, 2006, was the environmental law that was most applicable to the mineral industry. This act incorporated provisions of an older ordinance concerning the assessment of environmental impacts for mining projects (BGBl. IS. 1420), which was approved on July 13, 1990, and revised through slight changes to Article 8 (BGBl. IS. 2819) on December 9, 2006; the act also incorporated other older ordinances, such as one for the protection of groundwater against pollution caused by certain dangerous substances (BGBl. IS. 542), which was approved on March 18, 1997, and was still applicable to the use and disposal of many of the chemicals used in mining and mineral processing in Germany. The EIA Act requires Environmental Impact Assessments for all domestic waste repositories created or used by the mineral industry. The Federal Mining Act actually stipulates how these repositories are to be constructed and operated (monitored) (Bandt and others, 2003; Bundesministerium der Justiz, 2007, p. 30; Bundesministerium für Wirtschaft und Technologie, 2007, p. 36).

During 2006, the mineral industry was most concerned with the EU's new Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) legislation, which was approved at the end of the year for implementation starting on June 1, 2007. This new chemical control directive applies to many mine products, including imported mineral raw materials and waste materials from mining and mineral processing operations in Germany. The REACH legislation requires mineral producers to prove that these chemically complex substances should not be classified as hazardous materials by testing and registering all chemical contents of these materials (rather than leaving this task to EU regulators). REACH could allow classification of many industrial minerals and metals (including metals contained in scrap) as hazardous chemicals until proven otherwise by the producers. Along with other mineral industry representatives, German steel producers lobbied for scrap to no longer be classified as waste according to the European Waste Directive or defined as a hazardous material according to REACH (Association of German Steel Recycling and Disposal Companies and German Steel Federation, 2006).

Production

Data on mineral production are provided in table 1. In 2006, production of primary aluminum decreased by about 20% compared with that of 2005, mostly because of the closure of the Hamburger Aluminium-Werk GmbH (HAW) smelter at the beginning of the year. Startup of the new Neckarwerk recycling plant in January 2006 was the primary cause of increased production of secondary refined aluminum by slightly less than 11%. The new plant recovered both aluminum and magnesium metal from recycled materials to be delivered to the automotive and casting industries in southern Germany, and was thus the primary driver behind the 12% increase in production of magnesium metal in the country compared with that of 2005. In 2006, Germany used a total of about 27.4 million metric tons (Mt) of scrap metal as input into the country's metal (re)processing sector compared with 25.5 Mt in 2005; about 77.4% of this scrap metal consumption was used in the production of crude steel compared with about 77% in 2005. Thus, about 45% of crude steel production was based on scrap in 2006 compared with about 44% in 2005 (table 1; Bundesanstalt für Geowissenschaften und Rohstoffe, 2006, p. 52; 2007, p. 57; Aleris International, Inc., 2007, p. 11, 50; Norsk Hydro ASA, 2007, p. 44-45, 74, 113).

The production of iron ore in terms of both gross weight and iron content increased by about 16% in 2006 compared with 2005, but the average iron content of this material (which was used only for construction purposes and not in metallurgy) decreased to about 10.6% for 2006 and 2005 compared with about 14% for the 3 years prior to 2005. Although prices for natural gas and iron pellet feed as inputs into production of direct-reduced iron (DRI) in 2006 were comparable with prices in 2005, production increased by slightly less than 32% during this timeframe primarily owing to increased demand for DRI in place of more expensive and scarce iron and steel scrap as feed into electric arc furnaces to produce crude steel. Production of ferrochromium increased by slightly less than 18% primarily owing to new synergies after Kermas Ltd. (registered in the British Virgin Islands) acquired the German ferrochromium producer Elektrowerk Weisweiler GmbH (EWW) on June 1, 2005. This acquisition was part of a larger transaction that also involved Kermas acquiring Samancor Chrome Ltd. (located in South Africa) from former coowners Anglo American plc and BHP Billiton plc (of the United Kingdom). These acquisitions allowed EWW greater access to chromite ore from Samancor-operated mines in South Africa in addition to feed from three chromite mines already owned by EWW in Turkey. Production of other ferroalloys in Germany was estimated to have decreased by about the same proportion as the increase in ferrochromium production. In 2006, production of primary lead decreased by about 15% compared with that of 2005 at least partly owing to a 3-week shutdown at the Nordenham primary lead smelter in December to fix a technical problem with a smelting furnace (table 1; Southern African Legal Information Institute, 2005; Bundesanstalt für Geowissenschaften und Rohstoffe, 2006, p. 149; Metal Bulletin, 2006; International Chromium Development Association, 2007, p. 25; Metaleurop S.A., 2007; Midrex Technologies, Inc., 2007).

In 2005 and 2006, extraction of selenium from the treatment of copper-anodic slimes was estimated to have been noticeably higher in Germany as a result of a greater volume of imported copper concentrates processed in the country and greater demand for crude selenium (relative to supply) domestically and in the EU. Owing to increased supply from China and relatively low prices in 2002 and 2003, relatively less selenium was extracted from copper concentrates in Germany during those years. It was unclear why production of refined silver metal decreased by about 22% (122 t) in 2006 compared

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with production in 2005, because recovery of silver from copper anode slimes increased by about 12% (105 t) (table 1; Norddeutsche Affinerie AG, 2006, p. 58, 112, 118; 2007, p. 51, 74-75, 137, 145-146, 149-150; RETORTE Ulrich Scharrer GmbH, undated).

In 2006, production of bromine compounds increased by about 57% compared with that of 2005, mostly owing to increased processing of imported bromine-bearing mineral raw materials. Reliable data concerning domestic production of natural bromine compounds as a byproduct recovered from the crude magnesium salts produced during potash mining, however, was not available. Increasingly strict environmental regulations helped encourage greater demand for chalk to purify industrial waste water, and production of natural chalk increased by about 23% during the year, although information was not available regarding which of the country's natural chalk quarries were primarily responsible for the increase. Production of ceramic and refractory clays (only fire clay and chamotte were reported) increased by about 10%, but no information concerning the opening of any new mines compared with those identified as producing in 2005 was available. Thus, this increase was likely to have resulted from increased production at existing clay mines and quarries. Reliable information was unavailable to explain the growth of about 175% in the production of unspecified clays, and a detailed listing of the types of clays included in this production category was also not available. Production of fluorspar was reported to have increased by about 50%, but this indicated a level of national production that exceeded the listed capacity of the only mine believed to produce fluorspar in the country by about 18,000 metric tons (t) (tables 1, 2; Bundesanstalt für Geowissenschaften und Rohstoffe, 2007, p. 24, 28, 186,188, 222).

Production of anthracite and bituminous (hard) coal continued to decrease as the number of operating mines was reduced to eight in 2006 from nine in 2005. Owing to the policy of decreasing the Federal subsidy to hard coal mining in the country, this trend was expected to continue until all mines are closed around the time of the scheduled termination of the subsidy in 2018. The country's level of production of lignite in 2006 remained roughly equal to that of 2005, however, and was expected to remain a mainstay of the German mining industry and electrical power generation sector indefinitely. The ongoing removal of radioactive material from the former Wismut Mine site and surrounding contaminated areas continued to result in less annual recovery of uranium, although no hard date had yet been set for completion of this cleanup project (table 1; Gesamtverbandes des Deutschen Steinkohlenbergbaus, 2006, p. 59, 68; Casteel, 2007, p. 2-4).

Structure of the Mineral Industry

Table 2 is a list of major mineral industry facilities and their locations. In 2005, Alcoa Inc., Austria Metall AG, and Norsk Hydro ASA agreed to close their joint subsidiary HAW at the beginning of 2006, and it remained closed during the entire year. The partners then sold this primary aluminum smelter to Trimet Aluminium AG; the sale became effective on December 1. At the end of 2006, Aleris International Inc. changed the name of its German secondary aluminum and magnesium metal-producing subsidiary to Aleris Recycling GmbH from VAW-IMCO Guss und Recycling GmbH. The company increased its combined metal production capacity by 50,000 metric tons per year (t/yr) in Germany through startup of its new Neckarwerk recycling plant at Deizisau. At the end of 2006, Alsa Technologies GmbH completed a new plant to process aluminum salt slag; the plant, which was located at Toeging, had a production capacity of about 30,000 t/yr of alumina (Al_2O_3) content (O'Driscoll, 2006; Steffen, 2006; Aleris International, Inc., 2007, p. 11, 50; Norsk Hydro ASA, 2007, p. 44-45, 74, 113).

Omya AG was the leading producer of ground calcium carbonate (GCC) in the world. The company processed domestically mined chalk and limestone to produce GCC. Because reliable figures were not available for actual GCC production (separate from those for production of limestone or natural chalk) in 2006, an estimated level of GCC production is not included in table 1 to avoid possible double counting. At the end of 2005, Graphit Kropfmühl AG closed its only graphite mine in Germany but continued to produce natural graphite in the country from imports of ore from the company's mines in other countries (tables 1, 2; Mining Journal, 2007).

Deutsche Steinkohle AG closed the Lohberg/Osterfeld colliery, including a coking plant, at the end of 2005. This left only eight anthracite and bituminous coal mines operating in the country and the resulting decline in production resulted in increased imports of coke and coking coal by the steel industry (Gesamtverbandes des Deutschen Steinkohlenbergbaus, 2006, p. 35, 59, 68, 73; Casteel, 2007, p. 3).

In May 2006, Mining & Chemical Products Ltd. (MCP) and Recapture Metals Inc. acquired Geo Gallium S.A. as a 50-50 joint venture, including Geo Gallium's Ingal-Stade primary gallium (crude) production facility. Production was estimated to have been about 12 t/yr from 2002 through 2006 because the price of gallium had been depressed from 2001 to 2005 and excess production capacity was not easily restarted in response to increasing prices in 2006. Full gallium production capacity as a byproduct of alumina refining at the Ingal-Stade plant was last listed in 2001 at about 35 t/yr after Geo Gallium expanded capacity to extract crude gallium in response to high prices in 1999 and 2000 (Compound Semiconductor.net, 2004; Abrams, 2006).

In the steel sector of the mineral industry, consolidation of ownership in Germany increased in June 2006 with the acquisition of Arcelor S.A. (based in Luxembourg) by Mittal Steel Co. NV of the Netherlands. Arcelor completely owned EKO Stahl GmbH, Stahlwerke Bremen GmbH, and Stahlwerk Thüringen GmbH in addition to a majority interest (51.25%) in AG der Dillinger Hüttenwerke. Mittal had already acquired Hamburger Stahlwerke GmbH in 1995 and two steel plants near Duisburg in 1997. At the end of 2006, Mittal renamed EKO Stahl and Stahlwerke Bremen as Arcelor Eisenhüttenstadt GmbH and Arcelor Bremen GmbH, respectively, and sold Stahlwerk Thüringen to Alfonso Gallardo S.A., although this sale was not scheduled to be finalized until March 5, 2007 (Businessworld, 2005; AG der Dillinger Hüttenwerke, 2007; Mittal Steel Co. NV, 2007, p. 2, 31, 52-54, 63, 70, F-35; Stahlwerk Thüringen GmbH, 2007).

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Mineral Trade

In 2005 (the latest year for which reliable trade data were available), Germany spent 3.5% of its nominal GDP (or about $96 billion) on imports of mineral commodities, including crude petroleum ($43.3 billion), natural gas ($21.2 billion), nonferrous metals ($10.6 billion), ferroalloys ($5.66 billion), precious metals and stones ($4.6 billion), iron and steel ($3.93 billion), coal (mostly anthracite and bituminous coal) ($3.65 billion), industrial minerals ($1.73 billion), and other mineral fuels, including uranium ($1.44 billion) (Bundesanstalt für Geowissenschaften und Rohstoffe, 2006, p. 31-32; International Monetary Fund, 2007).

In 2005, the metal processing sector succeeded in reducing the amount of aluminum scrap and iron and steel scrap that was exported; however, the sector exported more copper scrap for processing outside of the country compared with levels exported in 2004. Germany exported about 7.5 million metric tons (Mt) of iron and steel scrap compared with about 9.2 Mt in 2004; 584,000 t of scrap aluminum compared with 614,000 t in 2004; and 439,000 t of refined copper scrap compared with about 408,000 t in 2004. The country also exported less scrap that contained cobalt, gallium, lead, magnesium, and tin, but exported more bismuth, nickel, tungsten, and zinc contained in scrap compared with export levels in 2004. Most scrap metal exports were shipped to other EU countries, but China was a significant importer of scrap aluminum and the leading importer of scrap copper and zinc from Germany (table 3; Bundesanstalt für Geowissenschaften und Rohstoffe, 2006, p. 15-20, 100-102).

The rest of Germany's trade in metals reflected its primary role in the global mineral industry as an importer of metallic ores and concentrates and an exporter and consumer of processed metal; even refined metals were mostly not exported but further used in German industrial production of automobiles, machinery, and other finished products. Thus, Germany was a leading global consumer of metals. The country also played a role as an important transshipper of some minerals in raw form, including beryllium, niobium (columbium), rubidium, tellurium, tungsten, and zirconium (tables 3, 4; Bundesanstalt für Geowissenschaften und Rohstoffe, 2006, p. 15-20, 25-27, 83-91, 100-102).

As a primary producer, Germany was an important supplier of cement, kaolin, feldspar, peat, salt, silica sand, and sulfur, almost entirely to other EU countries. The U.S. market was not a leading destination for industrial minerals from Germany. As Germany has continued gradually to reduce the Government's subsidy on mine production of hard coal, the country has become more dependent on imports. The steel manufacturing sector has become especially dependent on imports of hard coking coal as domestic supplies have continued to decrease. Before Poland officially joined the EU in 2004, Germany's most significant sources of hard coal and coke were all outside of the EU, including, in order of quantity imported, Australia, Canada, South Africa, Russia, Colombia, China, Ukraine, and Vietnam. Germany was basically self-sufficient in lignite but substantially import-dependent on all other mineral fuels. The only mineral fuel for which the United States was a significant importer from Germany was enriched uranium (tables 3, 4; Bundesanstalt für Geowissenschaften und Rohstoffe, 2006, p. 81-82, 98-99, 111-115).

Commodity Review

Metals

Aluminum.—At the end of 2005, Norsk Hydro closed the HAW smelter in agreement with the two other joint owners. Hydro also closed its Elbewerk primary aluminum plant at Stade at the end of 2006. These closures were reportedly in response to the inability of the company to secure energy contracts for these plants at rates that would sustain profitable production for a sufficient period into the future. The company also expressed concern about increasing costs associated with purchasing alumina feed for these two smelters in 2005, although the price of alumina decreased in 2006. In part encouraged by this decrease in the price of alumina, Trimet Aluminium purchased HAW from the former owners in November 2006 and planned to restart production there at full capacity by the end of 2007. Norsk Hydro also reached an agreement to sell the plant site at Stade to two energy systems companies, which were interested in converting the facilities to include a combined heat and power station, a plant to produce bioethanol, and a plant to manufacture wind-turbine rotor blades (Knutzen and Steffen, 2006; Norsk Hydro ASA, 2007, p. 44-45, 74, 113).

Copper.—Norddeutsche Affinerie (NA) accounted for most of the production of refined copper and copper products in Germany, and the company was a significant producer (in Germany and in the EU) of various byproducts, including gold, platinum-group metals, selenium, silver, and sulfuric acid. On average, the company purchased 90% of the copper concentrates that it used in primary production according to the terms of long-term contracts and only 10% were purchased on the spot market. The annual input requirement of copper concentrate for NA was slightly greater than 1 Mt/yr, and the company had a long-term supply contract with the Escondida Mine in Chile (the world's leading copper mine in 2005) for approximately 10% to 15% of this input. Despite a 25-day strike at Escondida in August 2006, however, the company reported that it had sufficiently diverse sources for supply of concentrate that the strike had an insignificant impact on NA's imports of copper concentrates during the year. Since the concentrates from different mines in different regions of the world have a slightly different composition, however, a significant reduction in the percentage of NA's input of copper concentrate from a mine as large as Escondida was expected to have had a significant impact on the company's production of some byproducts (Kassakovich, 2006; Platts Bureaus, 2006; Norddeutsche Affinerie AG, 2007, p. 64, 137).

On July 23, 2006, a tunnel collapsed at the Chuquicamata Mine in Chile, which was expected to disrupt supply of copper concentrate to Germany. During 2006, Germany imported about 201,500 t of fine copper from Chile compared with 184,400 t in 2005, and production of primary refined copper in Germany actually increased. In terms of tonnage of fine copper content in 2006, Germany ranked a distant 10th as a destination for exports out of Chile and accounted for about 3.9% of Chile's total

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exports (Harris, 2006; Comisión Chilena del Cobre, 2007, p. 37, 41; Norddeutsche Affinerie AG, 2007, p. 64, 137).

Gallium.—The capacity added by Geo Gallium at the Ingal-Stade plant in 2001 was reportedly never used as prices fell almost immediately thereafter and remained relatively low until 2005. MCP and Recapture expected to increase production to 24 t/yr in 2007 in response to increased demand for gallium. In the second half of 2006, crude gallium recovered at the plant in Stade began to be refined at Recapture's facilities in Utah and at MCP's facilities in the United Kingdom, rather than at Geo Gallium's plant in Salindres, France (Compound Semiconductor.net, 2004; Abrams, 2006).

Iron and Steel.—In 2006, ThyssenKrupp Steel AG was the 10th ranked producer in the world. The company continued to invest in an expansion of its crude steel production capacity in Sepetiba, Brazil, where costs were considerably lower than in Germany and the availability of mineral raw materials, especially iron ore, was substantially higher. Companhia Vale do Rio Doce of Brazil had a 10% ownership interest in the new Brazilian steel mill, and ThyssenKrupp expected the mill to have a production capacity of 4.4 Mt/yr of crude steel and to be completed by about March of 2009 (ThyssenKrupp Steel AG, 2007, p. 9, 30, 37, 56; Bundesministerium für Wirtschaft and Technologie, 2008).

Selenium.—At the end of 2004, Norddeutsche Affinerie AG finished developing a new design for photovoltaic cells to be constructed using larger proportions of the metallic mineral materials that the company produced itself (including copper, indium, and selenium). In 2006, the company was nearing completion of a plant to produce its own photovoltaic cells with this newer technology, which was expected to increase demand for selenium extracted from its own copper processing operations as well as the company's imports of crude selenium from copper smelters in other countries (Norddeutsche Affinerie AG, 2006, p. 22-23, 74, 118; 2007, p. 5, 145).

Industrial Minerals

Cement.—In 2006, HeidelburgCement AG was the leading producer of cement in Germany and the fourth ranked producer in the world. In January, HeidelburgCement (along with Holcim Deutschland AG and SCHWENK Zement KG) was added to a list of three other major cement companies (CEMEX Deutschland AG, Dyckerhoff AG, and Lafarge Zement GmbH) that were being cited for illegal cartel activity in Germany. The Government proceedings against cartel activity in the cement production sector had been started in 2002, and an initial court decision was not expected until 2008. In 2006, most of these companies were attempting to counter the high production costs in Germany by substituting more blast furnace slag (recycled from steel production) and fly ash (recovered from coal driven power stations) for clinker in domestic cement production. The only news concerning a change in ownership was that the parent company of Dyckerhoff, Buzzi Unicem SpA, announced on October 30 that it would be interested in buying up more share capital in this subsidiary. Buzzi Unicem's offer ran through January 29, 2007, at which time it had increased its total ownership share in Dyckerhoff to 88.37% compared with 78.58% in 2006 (ICR Research, 2006; Dyckerhoff AG, 2007, p. 8, 19-20, 33; HeidelburgCement AG, 2007, p. 35, 115).

Clay and Shale.—In 2006, the leading producer of clays continued to be the large foreign-owned WBB Fuchs GmbH & Co. KG (a specialist in kaolinitic clays); other significant German companies were smaller, family-owned SMEs, such as Goerg & Schneider GmbH & Co. and Stephan Schmidt KG. Germany was one of the leading producers of kaolin in Western Europe. All these producers were able to remain internationally competitive by producing relatively valuable customized blends, which was still cost effective because up to 25 different clays could be extracted from any one pit. The clay and shale operations of almost all the leading companies were located in the Westerwald region. WBB Fuchs specialized in high-alumina blue clays, light-firing refractory clay, and kaolins for refractories. The company produced about 200 different blends of clays, many for specific ceramic applications, such as isostatic pressing and pressure casting. Stephan Schmidt produced white- and light-firing clays, red-firing clays with high mechanical strength, special clays for engobes and glazes, binding clays, granulated clays, and spray-dried clay bodies. Georg & Schneider specialized in refractory clays, especially chamotte (or firebrick clay) and ball clays (or plastic clays). All these clay blends contained kaolins, but WBB Fuchs produced the highest grade kaolin with, on average, about 38% Al_2O_3 content (King, 2006).

Strontium.—On November 18, 2005, Solvay S.A. announced the formation of a new joint company with Chemical Products Corporation (CPC) called Solvay & CPC Barium Strontium GmbH & Co. KG. During 2006, the company's main production facility for barium and strontium carbonates in Germany was located in Bad Hoenningen, near Hannover, and was owned 75% by Solvay and 25% by CPC. Previous to the joint-venture agreement, this plant was 100% owned by Solvay and operated by the company's German subsidiary, Solvay Barium Strontium GmbH. Solvay reported that it reduced capacity to produce barium and strontium at this manufacturing facility, but it was unclear by how much the capacity was reduced below the production capacity of 95,000 t/yr of strontium carbonate listed for the plant at the beginning of the year. During the year, both CPC and Solvay separately operated celestite (strontium sulfate) mines in Mexico, Spain, and elsewhere that provided crude mineral feed for the production of strontium carbonate at the German plant (Solvay S.A., 2005; 2007, p. 32; Coope, 2006; Industrial Minerals, 2006; Taylor, 2006).

Mineral Fuels

Coal.—Hard coal mining is centered in the Ibbenbüren, the Ruhr, and the Saar coalfields in Germany and is uneconomical without subsidies because the current resources lie at great depths underground. As the hard coal subsidy is phased out, more mines will be closed resulting in greater imports of hard coal, coking coal, and coke. In 2006, the Lippe and the Walsum Mines were scheduled to be closed in 2009 and 2010, respectively (Bundesministerium für Wirtschaft und Technologie, 2007, p. 39).

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Reserves and Resources

There were no metallic mineral reserves in Germany in 2006, and it was expected that there will be no mining of anthracite and bituminous coal once the hard coal subsidy is removed. However, mining has had a long tradition in Germany and the country still contains diverse resources of coal, metallic, and nonmetallic minerals. In 2006, Germany's main reserves, in decreasing order of value, were of lignite, kaolin, feldspar, oil shale, rock salt, potash, bentonite, coking coal, sulfur, barite, graphite, fluorspar, silica sand, natural stone aggregates, potash-magnesium salts and anhydrite, and dolomite-limestone-marl (Casteel, 2007, p. 2, 4, 10, 12).

Outlook

In 2006, costs for energy and mineral raw materials continued to increase in the country and were blamed for the closure of at least two primary aluminum smelters, although one of those is scheduled to be restarted by the end of 2007. The ongoing response of companies in the mineral industry was to restructure internally to reduce costs as much as possible and to invest in developing new capacity abroad rather than domestically. Additionally, vertical integration and concentration of ownership increased, especially in the steel sector. In the metal processing sector, it can be expected that more of the metals companies that have so far been mostly left out of the recent wave of mergers and acquisitions will be attempting to find additional partners in 2006 and 2007 in order to keep up with the economies of scale and scope that recently merged rivals were expected to take advantage of (Bundesverband der Deutschen Industrie e.V., 2006).

Even as the scarcity of domestic mineral fuels in Germany increases, the Government's hard coal subsidy continues to be phased out. Together with other high operating costs in Germany, the higher cost of imports of hard coal, coking coal, and coke can be expected to cause stress on maintaining domestic steel manufacturing capacity. In general, maintaining an economically important mineral industry in Germany is likely to involve further reductions in costs for companies, including those for labor, energy, and taxes, to encourage investment in continuing mineral production and at least maintain processing capacity domestically.

References Cited

Abrams, Ovid, 2006, MCP, Recapture buy primary gallium production facility: Platts Metals Week, v. 77, no. 26, June 26, p. 5.

AG der Dillinger Hüttenwerke, 2007, Facts & figures: Dillingen-Saar, Germany, AG der Dillinger Hüttenwerke, July, 2 p.

Aleris International Inc., 2007, Annual report on Form 10-K for the fiscal year ended December 31, 2006: Beachwood, Ohio, Aleris International Inc., April 2, 91 p.

Association of German Steel Recycling and Disposal Companies and German Steel Federation, 2006, Scrap steel should no longer be declared as waste: Düsseldorf, Germany, Association of German Steel Recycling and Disposal Companies and German Steel Federation joint statement and press release, September 5, 1 p.

Bandt, G., Posnatzki, B., and Beckers, K-A., 2003, Final disposal of radioactive waste in Germany—Plan approval process of Konrad Mine and acceptance requirements: Hannover, Germany, TÜV Hannover/Sachsen-Anhalt e.V. and Niedersächsisches Umweltministerium, February, 8 p.

Bundesanstalt für Geowissenschaften und Rohstoffe, 2006, Rohstoffsituation 2005: Hannover, Germany, Bundesanstalt für Geowissenschaften und Rohstoffe, October, 203 p.

Bundesanstalt für Geowissenschaften und Rohstoffe, 2007, Rohstoffsituation 2006: Hannover, Germany, Bundesanstalt für Geowissenschaften und Rohstoffe, October, 224 p.

Bundesministerium der Justiz, 2007, Bundesberggesetz (BBergG): Berlin, Germany, Bundesministerium der Justiz, April 29, 95 p.

Bundesministerium für Wirtschaft und Technologie, 2007, Der Bergbau in der Bundesrepublik Deutschland 2006: Berlin, Germany, Bundesministerium für Wirtschaft und Technologie, November, 146 p.

Bundesministerium für Wirtschaft und Technologie, 2008, Stahl und Metall: Bundesministerium für Wirtschaft und Technologie, June 30. (Accessed August 18, 2008, at http://www.bmwi.de/BMWi/Navigation/Wirtschaft/branchenfokus,did=171736.html.)

Bundesverband der Deutschen Industrie e.V., 2006, Export champion and Bazaar economy—How Germany is coping with globalization: Berlin, Germany, Bundesverband der Deutschen Industrie e.V., BDI Foreign Economic Report, September, 4 p.

Businessworld, 2005, Recasting global steel: Kolkata, India, ABP Pvt. Ltd., August 15, p. 30-38.

Casteel, Kyran, 2007, Best of Germany 2007—A supplement to Engineering & Mining Journal: Engineering & Mining Journal, Mining Media Inc., July/August, 64 p.

Comisión Chilena del Cobre, 2007, Estadísticas del cobre y otros minerales 1987-2006: Santiago, Chile, Comisión Chilena del Cobre, June, 154 p.

Compound Semiconductor.net, 2004, Low prices force cuts in gallium production: Institute of Physics Publishing, March 16. (Accessed July 16, 2007, at http://compoundsemiconductor.net/cws/article/news/19198.)

Coope, Brian, 2006, Spain's celestite celebration: Industrial Minerals, no. 466, July, p. 42-47.

Dyckerhoff AG, 2007, Geschäftsbericht 2006: Wiesbaden, Germany, Dyckerhoff AG, March 16, 177 p.

Economist Intelligence Unit Ltd., The, 2007, Country profile Germany 2007—Economic sectors—Financial services: London, United Kingdom, The Economist Intelligence Unit Ltd., August 15, 10 p.

Gesamtverbandes des Deutschen Steinkohlenbergbaus, 2006, Steinkohle jahresbericht 2006: Essen, Germany, Gesamtverbandes des deutschen Steinkohlenbergbaus, October, 73 p.

Harris, Paul, 2006, No evidence to support Cu stockpile rumour—CODELCO: Metal Bulletin, no. 8944, May 15, p. 14.

HeidelbergCement AG, 2007, Annual report 2006: Heidelberg, Germany, HeidelbergCement AG, March 21, 134 p.

ICR Research, 2006, Take a deep breath: Surrey, United Kingdom, International Cement Review, June, p. 20-26.

Industrial Minerals, 2006, Solvay and CPC unveil j-v details: Industrial Minerals, no. 460, January, p. 10.

International Chromium Development Association, 2007, ICDA statistical bulletin 2007 edition: Paris, France, International Chromium Development Association, 45 p.

International Monetary Fund, 2007, Germany, *in* World economic outlook database: International Monetary Fund, April. (Accessed August 23, 2007, via http://www.imf.org/external/pubs/ft/weo/2007/01/index.htm.)

Kassakovich, Natalia, 2006, NA looks for partner to develop projects outside EU: Metal Bulletin, no. 8958, August 21, p. 10.

King, Laura, 2006, Ball clays dig deep: Industrial Minerals, no. 464, May, p. 30-39.

Knutzen, T., and Steffen, M.S., 2006, Successor found for Hydro site in Stade: Oslo, Norway, Norsk Hydro ASA press release, July 5, 2 p.

Kullmann, Ulrich, 2007, Requirements for a modern mining law in the framework of European legislation: Berlin, Germany, Bundesministerium für Wirtschaft und Technologie, March 20, 13 p.

Marsch, K., Schmieder, C., and Forster-van Aerssen, K., 2007, Banking consolidation and small business finance—Empirical evidence for Germany: Frankfurt, Germany, Deutsche Bundesbank discussion paper, Series 2—Banking and Financial Studies, no. 09/2007, August 6, 31 p.

Metal Bulletin, 2006, Metaleurop declares force majeure at Nordenham: Metal Bulletin, no. 8974, December 11, p. 14.

Metaleurop S.A., 2007, 2006 results—2007 outlook: Paris, France, Metaleurop S.A., 6 p.

Midrex Technologies Inc., 2007, 2006 world direct reduction statistics: Charlotte, North Carolina, Midrex Technologies Inc., July 10, 11 p.

Digitized by Google

Mining Journal, 2007, Germany, 2006 and first quarter 2007: Mining Communications Ltd. country reports. (Accessed October 9, 2007, via http://www.mining-journal.com/Annual_Review.aspx.)
Mittal Steel Co. NV, 2007, Annual report on Form 20-F for the fiscal year ended December 31, 2006: Rotterdam, Netherlands, Mittal Steel Co. N.V., April 16, 293 p.
Norddeutsche Affinerie AG, 2006, Annual report 2004/05: Hamburg, Germany, Norddeutsche Affinerie AG, January 31, 120 p.
Norddeutsche Affinerie AG, 2007, Annual report 2005/06: Hamburg, Germany, Norddeutsche Affinerie AG, January 5, 150 p.
Norsk Hydro ASA, 2007, Annual report 2006, including Form 20-F: Oslo, Norway, Norsk Hydro ASA, March 16, 163 p.
O'Driscoll, Mike, 2006, Alumina in a Spin: Industrial Minerals, no. 467, August, p. 36-43.
Platts Bureaus, 2006, Escondida strike to affect Asian market first: sources—Europe's NA protected itself: Platts Metals Week, v. 77, no. 33, August 14, p. 6-7.
RETORTE Ulrich Scharrer GmbH, [undated], Company—History: RETORTE Ulrich Scharrer GmbH. (Accessed June 25, 2007, at http://www.retorte.de/english/firma.htm.)
Solvay S.A., 2005, Solvay and Chemical Products Corporation launch global barium strontium joint venture: Brussels, Belgium, Solvay S.A., press release, Solvay S.A., November 18, 2 p.
Solvay S.A., 2007, Solvay global annual report 2006: Brussels, Belgium, Solvay S.A., February 15, 144 p.
Southern African Legal Information Institute, 2005, Case no. 22/LM/Mar05 in the Competition Tribunal, Republic of South Africa—In the large merger between Kermas South Africa (Pty) Ltd. and Samancor Ltd.: Braamfontein, South Africa, Southern African Legal Information Institute, June 14, 5 p.
Stahlwerk Thüringen GmbH, 2007, Stahlwerk Thüringen—Grupo Alfonso Gallardo: Stahlwerk Thüringen GmbH. (Accessed June 25, 2007, at http://www.stahlwerk-thueringen.de/en/node/56?0.)
Statistik der Kohlenwirtschaft e.V., 2007, Zur lage des kohlenbergbaus in der Bundesrepublik Deutschland, Jahr 2003: Essen-Cologne, Germany, Statistik der Kohlenwirtschaft e.V., March, 13 p.
Statistisches Bundesamt, 2007, Fachserie 4, reihe 3.1—Produzierendes gewerbe, produktion im produzierenden gewerbe—Jahr 2006: Wiesbaden, Germany, Statistisches Bundesamt, April 30, 320 p.
Statistisches Bundesamt, 2008, Fachserie 7, reihe 1—Außenhandel, zusammenfassende übersichtenfür den außenhandel—Jahr 2006: Wiesbaden, Germany, Statistisches Bundesamt, January 11, 140 p.
Steffen, M.P., 2006, Hamburger Aluminium Werk sale signing paves way for restart: Oslo, Norway, Norsk Hydro ASA, press release, November 10, 1 p.
Taylor, Lindsey, 2006, Strontium—Still a TV star: Industrial Minerals, no. 460, January, p. 29-31.
ThyssenKrupp Steel AG, 2007, Annual report 2005-2006: Duisburg, Germany, ThyssenKrupp Steel AG, February 9, 65 p.
U.S. Library of Congress, Federal Research Division, 2007, Country profile—Germany: Washington, DC, U.S. Library of Congress, December, 25 p.
Vereinigung Rohstoffe und Bergbau e.V., 2006, Der beitrag der rohstoffindustrie zur gesamtwirtshaftlichen wertschöpfung: Berlin, Germany, Vereinigung Rohstoffe und Bergbau e.V., January, 1 p.
Whitlock, Craig, 2007, German hard-coal production to cease by 2018: The Washington Post, July 30, p. A10-A11.
World Tax Inc., 2007, Germany foreign investments incentives: World Tax Inc. (Accessed September 21, 2007, at http://www.worldwide-tax.com/germany/ger_invest.asp.)

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TABLE I
GERMANY: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006
METALS						
Aluminum:						
Alumina, Al_2O_3 equivalent[e]	thousand metric tons	717	830	835	830	850
Metal:						
Primary		652,845	660,793	667,839	647,934	515,539
Secondary		666,148	680,385	703,756	718,291 r	795,668
Total		1,318,993	1,341,178	1,371,595	1,366,225 r	1,311,207
Arsenic, white, As_2O_3 content[e]		100	--	-- [2]	-- [2]	--
Cadmium, metal, refinery including secondary[e]		422 [2]	640 [2]	640	640	640
Copper, metal:						
Smelter:						
Primary		295,100	288,800	278,600	257,200	273,800
Secondary		283,100	306,600	262,600	251,400	266,300
Total		578,200	595,400	541,200	508,600	540,100
Refined:						
Primary		327,000	286,653	283,686	293,812 r	312,092
Secondary		368,791	310,925	368,956	344,446 r	350,246
Total		695,791	597,578	652,642	638,258 r	662,338
Gallium, crude[e]		12	12	12	12	12
Iron and steel:						
Ore, run of mine:[3]						
Gross weight	thousand metric tons	419	429	412	362	412
Fe content	do.	59	60	58	38	44
Metal:						
Pig iron	do.	29,427	29,461	30,018	28,854	30,362
Direct-reduced iron	do.	540	590	593 r	440 r	580
Ferroalloys:						
Ferrochromium		20,018	18,318	24,857	22,672	26,710
Other[e, 4]		30,000	32,000	26,000	25,000	20,500
Steel, crude	thousand metric tons	45,015	44,809	46,374	44,524	47,224
Semimanufactures	do.	37,763	37,174	39,976	37,771	41,174
Lead, metal, refined:						
Primary		141,202	132,155	115,869	118,778	100,450
Secondary		238,700 [5]	224,700 [5]	243,304	222,932	221,050
Total		379,902	356,900	359,173	341,710	321,500
Magnesium, metal, including castings		24,506	25,987	26,591	27,282 r	30,556
Platinum-group metals, metal, refined	kilograms	35,561	51,847	95,135	104,725	100,000 e
Selenium, metal[e]		600 r	661 r, 2	1,000 r	2,000 r	2,500
Silicon, metal		25,257	27,870 r	28,773 r	29,349 r	30,000
Silver, metal, refined, including secondary[6]		520	592	568	546	424
Tin, alloys		11,447	6,143	5,431	4,912	5,016
Zinc, metal:						
Primary		272,900	255,200	252,133	245,140	245,883
Secondary		105,700 [5]	132,900 [5]	129,887	89,751	96,683
Total		378,561	388,131	382,020	334,891	342,566
INDUSTRIAL MINERALS						
Abrasives:						
Natural, pumice		43,354	--	--	--	--
Artificial, corundum		56,728	59,097	72,565	73,620	75,817
Aluminum salt slag, Al_2O_3 equivalent[e]	thousand metric tons	200	200	200	200	200
Barite, marketable (contained $BaSO_4$)		100,993	109,506	93,624	88,591	85,524
Boron compounds, manufactured, including boric acid and oxide		168,250	176,837	168,841	203,475	222,169
Bromine compounds, manufactured, including oxide		413	388	248	274	431
Cement:						
Clinker, intended for market	thousand metric tons	23,954	25,233	26,281	24,378 r	24,952 p
Hydraulic	do.	31,009	32,749	31,854	31,009 r	33,516 p

See footnotes at end of table.

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TABLE 1—Continued
GERMANY: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006
INDUSTRIAL MINERALS—Continued						
Chalk, natural, including ground	thousand metric tons	1,022	1,001	1,005	1,068	1,309
Clays, natural:						
Bentonite	do.	495	479	405	352 r	364
Ceramic and refractory clays[e]	do.	4,700	4,300	4,400	4,500	4,600
Of which, fire clay and chamotte	do.	167	167	176	176	194
Kaolin, marketable	do.	3,682 r	3,504 r	3,752	3,768	3,815
Other, unspecified	do.	281	191	197	185	509
Diatomite[e]	do.	54 [2]	55 [2]	54	54	54
Feldspar		243,368	233,028 r	182,842 r	168,640 r	167,332
Fluorspar, acid-grade		34,429	33,289	33,203	35,364	53,009
Graphite, mine output		3,312	2,840	3,155	2,638	--
Gypsum and anhydrite:						
Natural	thousand metric tons	1,761	1,748	1,579	1,644	1,771
Byproduct of flue-gas desulfurization[e]	do.	7,100	7,660	7,660	7,640	7,600 p
Lime, quicklime, dead-burned dolomite	do.	7,139	6,876	6,947	6,823 r	7,119
Magnesium compounds, byproduct of potash mining	do.	1,411	1,288	1,197	1,290 r	1,203
Nitrogen, N content of ammonia	do.	2,560	2,803	2,741	2,789 r	2,718
Peat, natural		122,696	135,356	119,961	120,000 e	120,000 e
Phosphoric acid, manufactured, P_2O_5 content		34,486	32,569	37,810	37,374	34,373
Pigments, iron oxide[e]		4,000	4,000	4,000	4,000	4,000
Potash, K_2O content:						
Crude	thousand metric tons	4,278	4,413	4,439	4,434	4,385
Marketable	do.	3,472	3,563	3,627	3,664	3,625
Salt, NaCl content, marketable:						
Evaporated salt, including marine salt	do.	858	727	572	594	593
Industrial brines	do.	8,307	9,078	10,432	9,904	9,590
Rock salt and other brines	do.	6,572 r	6,620 r	7,833 r	8,834 r	9,663
Total	do.	15,737 r	16,425 r	18,837 r	19,332 r	19,846
Siliceous earth, marketable		53,711	54,517	54,801	50,399 r	53,282
Soda ash (Na_2CO_3), manufactured	thousand metric tons	1,512	1,493	1,438	1,533	1,515
Stone, sand and gravel:						
Stone, crude:						
Dimension, including partially worked	do.	237	167	229	212	219
Of which, dolomite and limestone	do.	76	106	76	75	75
Crushed, not including chalk	do.	166,798	160,851	152,985 r	150,117 r	162,168
Dolomite and limestone, not for cement manufacture	do.	31,300	30,000	23,700	20,600	22,400
Gravel, natural:						
Building gravel	do.	73,131	70,173	65,566	62,498 r	68,706
Crude, including flint and pebbles	do.	14,505	13,632	12,889	12,753 r	13,301
Other gravel, including quarzite	do.	11,877	13,295	10,898	12,014 r	13,326
Sand, natural:						
Building sand	do.	65,414	67,603	63,619 r	57,463 r	59,767
Silica sand, including glass sand and quartz sand	do.	7,839	7,953	8,162	7,681 r	7,703
Other, including from granite and pegmatite	do.	11,617	13,115	13,239	13,185 r	13,578
Total sand and gravel	do.	184,383	185,771	174,373 r	165,594 r	176,381
Strontium carbonate, manufactured[e]	do.	80	80	80	80	80
Sulfur:						
Marketable	do.	1,093	1,014	939	1,055	1,114
Byproduct:						
Metallurgy[e]	do.	754	701	591	600	600
Natural gas and petroleum	do.	1,745	1,661	1,503	1,585	1,686
Total	do.	2,499	2,362	2,094	2,190 e	2,290 e

See footnotes at end of table.

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TABLE 1—Continued
GERMANY: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006
MINERAL FUELS AND RELATED MATERIALS						
Asphalt and bitumen, natural		8,011	1,680	--	--	--
Coal:						
Anthracite and bituminous, marketable	thousand metric tons	26,363 r	25,873 r	25,872 r	24,907 r	20,882
Lignite	do.	181,746 r	179,087 r	181,926	177,908 r	176,324
Coke:						
Of anthracite and bituminous coal	do.	7,226	7,827	8,479 r	8,397 r	8,372
Of lignite	do.	154 e	165	187	173	181
Fuel briquets:						
Of anthracite and bituminous coal	do.	124	114	102	92	96
Of lignite, including dust and dried	do.	1,365	1,466	1,435	1,490 r	1,662
Gas:						
Manufactured:[e]						
Blast furnace	thousand cubic meters	8,781 [2]	8,936 [2]	9,100	8,800	9,000
Coke oven	do.	3,310 [2]	2,870 [2]	3,000	2,900	3,000
Total	do.	12,091 [2]	11,806 [2]	12,100	11,700	12,000
Natural:						
Gross	million cubic meters	21,422	22,092	20,264 r	19,762 r	19,667
Marketable	do.	20,116	20,190	19,333	18,666 r	18,443
Petroleum:[7]						
Crude	thousand 42-gallon barrels	27,600	27,900	25,800	26,200	25,800
Refinery products:						
Liquefied petroleum gas	do.	37,000	38,000	37,000	37,000	37,000
Distillate fuel oil	do.	350,000	360,000	370,000	390,000	380,000
Residual fuel oil	do.	65,000	69,000	77,000	74,000	76,000
Gasoline, including aviation	do.	210,000	210,000	210,000	210,000	210,000
Kerosene and jet fuel	do.	32,000	32,000	34,000	33,000	34,000
Naphtha	do.	82,000	86,000	94,000	94,000	90,000
Refinery gas	do.	48,700	51,600	51,300	50,600	49,100
Bitumen, bituminous mixtures, and other residues	do.	32,000	30,000	29,000	32,000	31,000
Lubricants and miscellaneous oils	do.	11,000	11,000	15,000	14,000	16,000
Petroleum coke	do.	9,400	10,000	10,000	11,000	11,000
Mineral jelly, waxes, and paraffins	do.	1,500	1,500	1,800	1,800	2,000
Other	do.	12,000	8,400	11,000	9,400	9,800
Total	do.	890,000	910,000	940,000	960,000	950,000
Uranium concentrate, U_3O_8 content[r]		261	177	91	111	77

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [p]Preliminary. [r]Revised. -- Zero.

[1]Table includes data available through October 2007.

[2]Reported figure.

[3]Iron ore is used domestically as an additive in cement and other construction materials but is of too low a grade to use in the steel industry.

[4]Estimated from reported domestic sales of ferroalloys [Statistische Bundesamt, 2007, Fachserie 4, Reihe 3.1—Produzierendes Gewerbe, Produktion im Produzierenden Gewerbe, Jahr 2006: Wiesbaden, Germany, Statistische Bundesamt, August, p. 176].

[5]Estimated by subtraction of primary from total, and rounded to four significant digits.

[6]Data may not include silver production as a byproduct of copper refining.

[7]All figures were converted to barrels from those reported in metric tons according to data from Mineralölwirtschaftsverband e.V., 2007, Jahresbericht—Mineralöl-Zahlen, 2006: Hamburg, Germany, Mineralölwirtschaftsverband e.V., May, p. 48, and reflect significant digits of conversion factors (three digits for crude petroleum and two digits for refinery products).

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TABLE 2
GERMANY: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1]

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners[2]	Location of main facilities	Annual capacity
Alumina		Nabaltec GmbH	Plant at Schwandorf	110
Do.		Aluminium Oxid Stade GmbH (DADCO Alumina & Chemicals Ltd., 100%)	Plant at Stade	900
Do.		Martinswerk GmbH (Albemarle Corporation, 100%)	Plant at Bergheim (fused alumina)	350
Aluminum		Hydro Aluminium Deutschland GmbH (Norsk Hydro ASA, 100%)	Primary smelters: Elbewerk at Stade (closed end-2006) and Rheinwerk at Neuss; Primary rolling mill at Grevenbroich	300
Do.		Aluminium Norf GmbH (Novelis Inc., 50%, and Hydro Aluminium Deutschland GmbH, 50%)	Lippenwerk at Luenen (secondary) and primary rolling mill at Neuss	600
Do.		Metallhüttenwerke Bruch GmbH	Secondary foundry alloy plant at Dortmund; secondary cast alloy plants at Asperg and Bad Saeckingen	110
Do.		Aleris Recycling GmbH (Aleris International Inc., 100%)	Secondary smelters: Erftwerk at Grevenbroich, Innwerk at Toeging am Inn, and Neckarwerk at Deizisau	320
Do.		Trimet Aluminium AG	Smelter at Essen-Borbeck	175 e
Do.		Hamburger Aluminium-Werk GmbH (HAW) (Trimet Aluminium AG, 100%)	Primary smelter at Hamburg (closed during 2006)	130
Do.		Corus Aluminium Voerde GmbH (Corus Group plc., 100%)	Primary smelter at Voerde, North Rhine-Westphalia	100
Aluminum salt slag		Alsa Technologies GmbH (Agor AG, 100%)	Plants at Hannover, Luenen, and Toeging	250
Do.		K+S Entsorgung GmbH (K+S Aktiengesellschaft, 100%)	REKAL plant at Sigmundshall	100
Arsenic, metal	metric tons	PPM Pure Metals GmbH (Metaleurop S.A., 100%)	Plant at Langelsheim	5
Barite		Sachtleben Bergbau GmbH	Clara Mine in the Black Forest and plant at Wolfach, and Dreislar Mine at Medebach-Dreislar	87
Do.		Deutsche Baryt-Industrie Dr. Rudolf Alberti GmbH & Co. KG (Sachtleben Bergbau GmbH, 75%, and other private, 25%)	Wolkenhügel mine in the Harz Mountains and plant at Bad Lauterberg	50
Bentonite		Süd-Chemie AG	Plants at Moosburg, Duisburg, and Heufeld	500
Do.		IKO Minerals GmbH (S&B Industrial Minerals S.A., 100%)	Stollberg plant at Oberhausen	200 e
Do.		Kärlicher Ton- und Schamotte-Werke Mannheim & Co. KG (KTS)	Quarry at Muelheim-Kaerlich	50
Calcium carbonate, natural, ground		Alpha Calcit Fullstoff GmbH & Co. KG	Plant at Cologne	250
Do.		Omya GmbH (Omya AG, 100%)	Plants at Burgberg, Emden, Lagerdorf, and Sohlde, and another plant near Hamburg	2,250
Cement		HeidelbergCement AG	Plant at Burglengenfeld; two plants at Ennigerloh; two plants at Geseke; plants at Koenigs Wusterhausen, Leimen, Paderborn, Mainz-Weisenau, and Schelklingen; the Lengfurt plant at Triefenstein; and plant at Wetzlar	9,500 e
Do.		Dyckerhoff AG (Buzzi Unicem SpA, 88.37%, and other private, 11.63%)	Plants at Deuna, Geseke, Goellheim, Lengerich, Neuss, Neuwied, and the Amöneburg plant at Wiesbaden	7,200
Do.		CEMEX Deutschland AG (CEMEX S.A. de C.V., 100%)	Two plants at Beckum; plants at Dortmund, Duisburg, Eisenhuettenstadt, and Ruedersdorf	6,000
Do.		SCHWENK Zement KG	Plants at Allmendingen, Bernburg, Heidenheim-Mergelstetten, and Karlstadt	5,000 e
Do.		Holcim (Deutschland) AG (Holcim Ltd., 88.9%, and other private, 11.1%)	HANSA plant at Bremen, plants at Laegerdorf and Rostock, and the Höver plant at Sehnde	3,600
Do.		Lafarge Zement GmbH (Lafarge S.A., 100%)	Plants at Kall-Soetenich, Karsdorf, and Walzbachtal	3,500
Do.		Holcim (Baden-Württemberg) AG (Holcim Ltd., 100%)	Plant at Dotternhausen	1,600
Do.		TEUTONIA Zementwerk AG (HeidelbergCement AG, 94.2%, and other private, 5.8%)	Plant at Hannover	900

See footnotes at end of table.

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TABLE 2—Continued
GERMANY: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1]

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners[2]	Location of main facilities	Annual capacity
Cement—Continued		Märker Zement GmbH	Plants at Harburg and Lauffen	NA
Chalk		Vereinigte Kreidewerke Dammann KG	Quarries and plants at Laegerdorf, on Ruegen Island, and at Soehlde	500
Clay, including ball and refractory clays		Stephan Schmidt KG	Tonbergbau Grube Anton open pit mine, Dornburg-Langendernbach, Müllenbach and Thewald Mines, Hoehr-Grenzhausen; Wiesa-Thonberg and Cunnersdorf quarries, Kamenz-Wiesa, Westerwald	1,400 e
Do.		Marx Bergbau GmbH & Co. KG (Stephan Schmidt KG, 100%)	Lämmersbach and Meudt Mines, Ruppach-Goldhausen quarry, Dornburg-Langendernbach, Westerwald	300 e
Do.		Goerg & Schneider GmbH & Co.	Quarry and main plant at Boden, others at Mogendorf, Goddert, Siershahn, Wirges/Staudt, and Kettenbach/Taunus, Westerwald region; others in Saxony and Eifel regions	NA
Do.		Mittelhessische Tonbergbau GmbH (Goerg & Schneider GmbH & Co., 50%, and Stephan Schmidt KG, 50%)	Quarry and plant in the Giessen/Lahn region	100
Do.		Rohstoffgesellschaft GmbH Ponholz	Mine and chamotte plant at Maxhuette-Haidoff, and Aufofweiher Mine, Bavaria	100
Do.		Adolf Gottfried Tonwerke GmbH	Quarries and plant near Grossheirath, Coburg, Bavaria	100
Coal, anthracite and bituminous		Deutsche Steinkohle AG (RAG Aktiengesellschaft, 100%)	Augusta Victoria/Blumenthal, Lippe, Ost, Prosper-haniel, Walsum, and West Mines, Ruhr region, North Rhine-Westphalia	16,000
Do.		do.	Saar Mine, Saar Basin, Saarland	6,000
Do.		do.	Ibbenbüren Mine, Steinfurt District, North Rhine-Westphalia	2,100
Coke from domestic coal		Deutsche Steinkohle AG (RAG Aktiengesellschaft, 100%)	Pitside coking plant at the Prosper-Haniel Mine	2,000 e
Coke from imported coal		ThyssenKrupp Steel AG	Schwelgern plant at Duisburg	2,100
Do.		Hüttenwerke Krupp Mannesmann GmbH (ThyssenKrupp Steel AG, 50%; Vallourec & Mannesmann Tubes SA, 20%; Mannesmannröhren-Werke GmbH, 30%)	Plant at Duisberg-Huckingen steel complex	1,100
Copper (cathodes)		Norddeutsche Affinerie AG (L. Possehl & Co. mbH, 10%; other institutional investors, 45%; other private investors, 45%)	Primary smelter and refinery and secondary plant at Hamburg	560 e
Do.		Hüttenwerke Kayser AG (Norddeutsche Affinerie AG, 100%)	Secondary plant and refinery at Luenen	185 e
Dolomite		Rheinkalk Hagen-Halden GmbH & Co KG (Lhoist NV, 100%)	Steinbruch-Donnerkuhle quarry and Hönnetal plant at Menden, and plant at Hagen-Halden	7,500
Feldspar		Amberger Kaolinwerke GmbH—Eduard Kick GmbH & Co. KG (Quarzwerke GmbH, 100%)	Mine at Hirschau, Bavaria	135
Do.		Gebrüder Dorfner GmbH & Co Kaolin-und Kristallquartzsand Werk KG	do.	NA
Ferrochrome		Elektrowerk Weisweiler GmbH (Kermas Ltd., 100%)	Plant at Eschweiler-Weisweiler, near Aachen	30
Fluorspar		Sachtleben Bergbau GmbH	Clara Mine in the Black Forest and plant at Wolfach	35
Gallium	metric tons	Geo Gallium S.A. (Mining & Chemical Products Ltd., 50%, and Recapture Metals Inc., 50%)	Ingal plant at Stade	35
Graphite, from imported ore	do.	Graphit Kropfmühl AG	Plant at Kropfmuehl, Passau	20,000
Do.	do.	do.	Plants at Bad Godesberg and Wedel, Holstein	8,000
Gypsum		VG-ORTH GmbH & Co. KG	Mine and plant at Stadtoldendorf, and plants at Osterode, Spremberg, and Witzenhausen	150
Do.		Gyproc GmbH Baustoff Production & Co. KG	Mines and plant in Lower Saxony	110
Iron, pig		ThyssenKrupp Steel AG	Two blast furnace plants at Hamborn and Schelgern	12,000

See footnotes at end of table.

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TABLE 2—Continued
GERMANY: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1]

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners[2]	Location of main facilities	Annual capacity
Kaolin		WBB Fuchs GmbH & Co. KG, subsidiary of WBB Minerals plc (S.C.R.- Sibelco NV, 100%)	25 quarries and 8 plants, including 2 at Ransbach and Kannenbäckerland plant in Hoehr-Grenzhausen, Westerwald region; also including quarries and plants of Kaolin-und Tonwerke Seilitz-Loethain, Saxony region	2,000
Do.		Amberger Kaolinwerke GmbH-Eduard Kick GmbH & Co. KG (Quarzwerke GmbH, 100%)	Mines at Caminau, Hirschau, Kemmlitz, and Schnaittenbach	300
Lead		Metaleurop Weser GmbH (Metaleurop S.A., 100%)	Primary smelter and refinery at Nordenham, and two combination plants at Langelsheim and Oker	145
Do.		Berzelius Metall GmbH	Primary smelter at Stolberg and secondary smelters at Braubach am Rhein and Freiberg/Sachsen	200
Do.		Sudamin MHD GmbH	Refinery at Duisburg	120
Do.		Norddeutsche Affinerie AG	Refinery at Hamburg	50
Lignite		RWE Power Aktiengesellschaft	Open pit mines in Rhenish mining area: Bergheim, Garzweiler, Inden, and Hambach	105,000
Do.		Vattenfall Europe Mining AG	Jänschwalde-Cottbus-Nord, Nochten, and Welzow-Süd mines, Lausatian mining area	60,000
Do.		Mitteldeutsche Braunkohlengesellschaft AG	Profen and Vereinigtes Schleenhain mines	25,000
Limestone		Harz-Kalk GmbH	Quarry at Ruebeland	2,000 e
Do.		Kalkwerk Bad Kösen GmbH	Quarry at Bad Koesen	2,000 e
Do.		Fels-Werke GmbH	Quarry at Kaltes Tal	2,000 e
Do.		Schäfer Kalk GmbH & Co KG	Plants at Hahnstaetten, Steeden, Stromberg, and Grevenbrueck	3,000
Do.		Rheinkalk GmbH & Co KG (Lhoist NV, 100%)	Flandersbach quarry and plant at Wuelfrath	7,500
Magnesium, metal, secondary		Norsk Hydro Magnesiumgesellschaft GmbH (Norsk Hydro ASA, 100%)	Plant at Bottrop	26
Do.		Aleris Recycling GmbH (Aleris International Inc., 100%)	Plant at Toeging am Inn	15
Do.		do.	Plant at Deizisau	50
Natural gas	million cubic meters	BEB Erdgas-Erdöl GmbH (ExxonMobil Central Europe Holding GmbH, 50%)	Plants at Clenze and Grossenkmeten	9,500
Do.	do.	Mobil Erdgas-Erdöl GmbH (ExxonMobil Central Europe Holding GmbH, 100%)	Plants at Scholen	4,000
Petroleum:				
Crude		The largest companies were:	6 areas with about 85 oilfields, including:	
Do.	thousand 42-gallon barrels	BEB Erdgas und Erdöl GmbH (ExxonMobil Central Europe Holding GmbH, 50%)	West of Ems River	30,000 e
Do.	do.	Wintershall AG (BASF AG, 100%)	Weser-Ems Rivers	21,000 e
Do.	do.	Deutsche Texaco AG	Elbe-Weser Rivers	20,000 e
Refined		The largest companies were:	About 20 refineries, including:	
Do.	do.	Deutsche Shell AG	Refineries at Godorf, Hamburg, and Grasbrook	256,000 e
Do.	do.	Esso Deutschland GmbH (ExxonMobil Central Europe Holding GmbH, 100%)	Refineries at Karlsruhe and Ingolstadt	245,000 e
Do.	do.	Ruhr Oel GmbH (Petróleos de Venezuela S.A., 50%, and BP Gelsenkirchen GmbH, 50%)	Refinery at Gelsenkirchen	215,500 e
Do.	do.	BAYERNOIL Raffineriegesellschaft mbH (OMV AG, 45%; Ruhr Oel GmbH, 25%; AGIP Deutschland GmbH, 20%; Deutsche BP AG, 10%)	Refinery at Neustadt-Donau	145,000 e
Potash, K_2O content		K+S Kali GmbH (K+S Aktiengesellschaft, 100%)	Mines at Bergmannssegen-Hugo, Niedersachen-Riedel, Salzdetfurth, Sigmundshall, Hattorf, Neuhof-Ellers, Sondershausen, and Wintershall	6,000

See footnotes at end of table.

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TABLE 2—Continued
GERMANY: STRUCTURE OF THE MINERAL INDUSTRY IN 2006[1]

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners[2]	Location of main facilities	Annual capacity
Salt (rock)	K+S Salz GmbH (K+S Aktiengesellschaft, 100%)	Mines at Bad Friedrichshall-Kochendorf, Braunschweig-Luneburg, Heilbronn, Riedel, Stetten, and Wesel (Borth)	15,000
Siliceous earth, silica	Hoffmann Mineral and Co. KG	Mine and plant near Neuburg	50
Silicon, metal metric tons	RW Silicium GmbH (Graphit Kropfmühl AG, 100%)	Four electric arc furnaces in plant at Pocking	27,500
Steel, crude	ThyssenKrupp Steel AG	Bruckhausen and Beeckerwerth plants, near Duisburg	12,000
Do.	Salzgitter AG	Plants at Peine and Salzgitter	6,400 e
Do.	Hüttenwerke Krupp Mannesmann GmbH (ThyssenKrupp Steel AG, 50%; Vallourec & Mannesmann Tubes SA, 20%; Mannesmannröhren-Werke GmbH, 30%)	Plant at Duisberg-Huckingen	5,600
Do.	Arcelor Bremen GmbH (Mittal Steel Co. NV, 99.88%, and other private, 0.12%)	Plant at Bremen	4,000
Do.	Saarstahl AG (Struktur-Holding-Stahl GmbH & Co KG, 74.9%, and Dillinger Hüttenwerke AG, 25.1%)	Plants at Burbach, Neunkirchen, and Voelklingen	3,000
Do.	AG der Dillinger Hüttenwerke (Mittal Steel Co. NV, 51.25%; Saarstahl AG, 33.75%; Struktur-Holding-Stahl GmbH & Co KG, 15%)	Plant at Dillingen	2,800
Do.	Arcelor Eisenhüttenstadt GmbH (Mittal Steel Co. NV, 100%)	Plant at Eisenhuettenstadt	2,800
Do.	Mittal Steel Co. NV	Plants at Duisburg and Hamburg	2,600 e
Do.	Badische Stahlwerke GmbH	Plant at Kehl	2,300 e
Do.	Brandenburger Elektrostahlwerk GmbH (RIVA FIRE S.p.A, 100%)	Plant at Brandenburg	1,700 e
Do.	ThyssenKrupp Nirosta (ThyssenKrupp Steel AG, 100%)	Plants at Bochum and Krefeld	1,600 e
Do.	Georgsmarienhütte GmbH	Plants at Bous, Georgsmarienhuette, and Groeditz	1,300 e
Do.	Stahlwerk Thüringen GmbH (Alfonso Gallardo S.A., 100%)	Plant at Unterwellenborn	1,100 e
Do.	Deutsche Edelstahlwerke GmbH	Plants at Siegen and Witten	1,100 e
Do.	Lech-Stahlwerke GmbH (Max Aicher GmbH & Co. KG, 100%)	Plant at Herbertshofen	1,100 e
Do.	Hennigsdorfer Elektrostahlwerk GmbH (RIVA FIRE S.p.A, 100%)	Plant at Hennigsdorf	1,000 e
Do.	Elbe-Stahlwerke Feralpi GmbH (Feralpi Siderurgica S.p.A., 100%)	Plant at Riesa	900 e
Strontium carbonate	Solvay & CPC Barium Strontium GmbH & Co. KG (Solvay S.A., 75%, and Chemical Products Corporation, 25%)	Plant at Bad Hoenningen, near Hannover	95
Zeolites	Hans G. Hauri Mineralstoffwerk GmbH	Mine and plant at Boetzingen, near Freiburg	NA
Zinc, metal	Xstrata plc	Smelter at Nordenham	155 e
Do.	Ruhr-Zink GmbH	Refinery at Datteln	140
Do.	Sudamin MHD GmbH	Smelter at Duisburg	100

eEstimated; estimated data are rounded to no more than three significant digits. NA Not available.
[1]Table includes data available through October 2007.
[2]Many more industrial minerals companies are listed in the Industrial Minerals Directory, 2003, but an updated directory had not been published by October 2007.

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TABLE 3
GERMANY: EXPORTS OF SELECTED MINERAL COMMODITIES IN 2005[1]

(Metric tons unless otherwise specified)

Commodity		Total	Destinations[e] United States	Other (principal[2])
METALS				
Aluminum:				
Bauxite, ore and concentrate		28,087	--	Sweden 5,510; France 4,630; Netherlands 3,400.
Oxides		204,075	11,200	Italy 31,600; United Kingdom 26,700; Poland 22,000.
Hydroxides	thousand metric tons	528	68	Netherlands 145; United Kingdom 70; Italy 35.
Ash and residue containing aluminum		21,126	--	France 5,280; Spain 4,520; Netherlands 3,800.
Metal, including alloys:				
Primary, not alloyed		60,757	--	Austria 23,300; Czech Republic 12,600; Italy 8,200.
Primary, alloys, all forms		167,497	--	Austria 48,200; Belgium 32,300; Poland 13,100.
Secondary		163,345	--	France 33,800; Netherlands 27,000; Italy 21,200.
Scrap		583,987	--	Italy 136,000; Austria 99,900; Netherlands 94,000.
Antimony:				
Ore and concentrate		3	--	Austria, 100%.
Metal, including alloys, all forms		12	--	Sweden 3; Japan 2; Taiwan 2.
Arsenic, metal, including alloys, all forms		20	5	Belgium 8; China 2; Japan 2.
Bismuth, metal, including alloys, all forms		349	--	France 153; Belgium 105; Slovenia 35.
Chromium, ore and concentrate		14,188	--	Czech Republic 3,830; Slovakia 2,500; Austria 1,920.
Cobalt:				
Ore and concentrate		171	--	Belgium 87; China 77.
Oxides and hydroxides		185	--	China 85; France 37; Italy 15.
Metal, including alloys, all forms		444	--	United Kingdom 133; France 107; Japan 37.
Scrap		384	99	United Kingdom 109; Finland 99; France 59.
Copper:				
Ore and concentrate		46,139	--	Sweden 44,500.
Matte and speiss, including cement copper		535	--	Canada 525.
Ash and residue containing copper		15,928	--	Belgium 9,700; Canada 3,150; Austria 1,190.
Metal, including alloys:				
Unrefined		232	--	Austria 110; Netherlands 80; Slovenia 22.
Refined, not alloyed		149,083	22,400	France 64,700; Italy 28,800; United Kingdom 9,540.
Alloys, all forms		20,232	--	Italy 3,950; Switzerland 2,140; France 2,120.
Scrap		439,134	--	China 187,000; Netherlands 80,800; Belgium 34,700.
Gallium, indium, and thallium, metal including scrap		15	--	France 13.
Germanium, oxides		259	--	United Kingdom 161; Italy 21; France 14.
Gold:				
Metal, including alloys, all forms	kilograms	82	20	Austria 48; Japan 5.
Waste and sweepings		31	--	Italy 17; Switzerland 11.
Iron and steel:				
Ore and concentrate		7,023	--	Slovakia 2,420; Switzerland 2,090; France 1,070.
Pyrite, roasted		7,257	--	Switzerland 5,840; Ireland 1,400.
Ash and residue containing iron	thousand metric tons	940	--	France 352; Luxembourg 193; United Kingdom 174.
Metal:				
Pig iron, cast iron, related materials		82,776	--	France 19,000; Czech Republic 15,300; Italy 9,020.
Scrap	thousand metric tons	7,544	--	France 1,690; Netherlands 1,580; Luxembourg 1,270.
Sponge iron, powder		175,291	--	France 123,000; Unspecified 51,000.
Ferroalloys:				
Ferrochromium		26,472	5,510	Austria 3,710; Italy 3,280; Sweden 3,120.
Ferromanganese		12,660	--	Austria 2,990; Switzerland 2,960; France 1,350.
Ferromolybdenum		3,867	--	Italy 1,110; Czech Republic 1,090; France 418.
Ferronickel		31	--	Switzerland 19; Belgium 6; Czech Republic 2.
Ferrosilicochromium		4	--	India, 100%.
Ferrosilicomagnesium		14,254	--	Italy 5,630; France 2,000; Netherlands 1,150.
Ferrosilicomanganese		2,928	--	Belgium 890; France 691; Switzerland 685.
Ferrosilicon		53,979	--	France 17,400; Belgium 7,720; Austria 6,800.
Ferrotungsten		176	--	Italy 52; Austria 35; Belgium 28.
Ferrotitanium		5,263	--	Italy 1,170; France 763; Sweden 742.

See footnotes at end of table.

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TABLE 3—Continued
GERMANY: EXPORTS OF SELECTED MINERAL COMMODITIES IN 2005[1]

(Metric tons unless otherwise specified)

Commodity		Total	Destinations[e] United States	Other (principal[2])
METALS—Continued				
Iron and steel, metal, ferroalloys—Continued:				
Ferrovanadium		528	--	Italy 292; United Kingdom 55; Spain 45.
Ferroniobium		1,448	107	Italy 408; Belgium 278; France 161.
Other ferroalloys		11,585	--	Italy 2,440; France 2,220; Slovenia 857.
Steel, crude		1,999	--	United Kingdom 270; Australia 262; Bahrain 240.
Lead:				
Ore and concentrate		102	--	China, 100%.
Lead containing antimony		15,090	--	Czech Republic 6,810; Austria 4,060; France 1,480.
Metal, including alloys:				
Alloys, all forms		25,382	--	France 7,970; Belgium 7,610; Czech Republic 4,370.
Refined		81,647	--	France 39,400; Czech Republic 18,000; Austria 10,700.
Unrefined		2	--	Portugal, 100%.
Scrap		19,493	--	Belgium 12,400; Netherlands 4,660.
Lithium carbonate		2,991	--	France 763; Belgium 505; United Kingdom 269.
Magnesium, metal, including alloys:				
Scrap		12,913	--	Austria 4,380; Czech Republic 4,330; Netherlands 749.
Unwrought		8,372	--	Romania 1,570; Hungary 1,410; Austria 1,310.
Manganese, ore and concentrate		3,218	--	Belgium 2,730.
Mercury		36	11	Sweden 5; Liechtenstein 4; Singapore 3.
Molybdenum, ore and concentrate		2,770	247	China 762; Belgium 717; Netherlands 407.
Nickel:				
Matte, speiss, related materials		5,604	--	Canada, 100%.
Oxides and hydroxides		102	16	Japan 67.
Ash and residue containing nickel		427	--	Netherlands 210; Sweden 179; Austria 38.
Metal, including alloys:				
Alloys, all forms		9,376	--	Austria 7,180; Sweden 863; France 750.
Unalloyed		8,988	--	Netherlands 3,800; Austria 1,570; France 935.
Scrap		9,342	972	Netherlands 2,960; Italy 1,160; United Kingdom 869.
Platinum-group metals:				
Waste and sweepings		1,649	825	Belgium 620; United Kingdom 99.
Metal, including alloys, all forms:				
Platinum	kilograms	38,394	5,680	Belgium 11,100; Switzerland 6,100; China 5,950.
Palladium	do.	16,639	4,410	Switzerland 2,160; Brazil 1,910; Japan 1,350.
Rhodium	do.	4,681	726	Belgium 1,570; Japan 768; Brazil 365.
Iridium, osmium and ruthenium	do.	9,034	6,170	Hong Kong 958; Belgium 578.
Rare-earth metals, including alloys:				
Metal		1	--	Malaysia < 1; South Korea < 1.
Compounds, all forms		123	--	France 22; Malaysia 13; Russia 13.
Selenium, elemental		205	36	Belgium 23; Mexico 21; Hong Kong 19.
Silver:				
Metal		1,583	--	Unspecified 1,020; Turkey 120; Belgium 104.
Powder	kilograms	58,454	3,040	France 20,300; Greece 17,200; Japan 5,030.
Tin:				
Ore and concentrate		163	--	Belgium, 100%.
Ash and residue containing tin		764	--	Belgium 672; Netherlands 77.
Metal, including alloys		1,672	--	Netherlands 575; Austria 279; Poland 174.
Scrap		701	--	France 501; Belgium 92; Netherlands 53.
Titanium, ore and concentrate		607	--	Italy 263; France 177; Mexico 83.
Tungsten:				
Ore and concentrate		43	--	Netherlands, 100%.
Metal, including alloys:				
Metal		915	--	Unspecified, 100%.
Scrap		2,894	860	Austria 518; United Kingdom 382; Sweden 333.
Wolframite		2,753	--	Unspecified, 100%.

See footnotes at end of table.

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TABLE 3—Continued
GERMANY: EXPORTS OF SELECTED MINERAL COMMODITIES IN 2005[1]

(Metric tons unless otherwise specified)

Commodity		Total	Destinations[e] United States	Other (principal[2])
METALS—Continued				
Vanadium, oxides and hydroxides		1,216	--	Unspecified, 100%.
Zinc:				
Ore and concentrate		7,257	--	Belgium 3,710; Serbia 2,410; Netherlands 1,020.
Matte and related materials		8,875	--	Belgium 2,640; Netherlands 1,900; Luxembourg 1,160.
Blue powder		5,211	552	Switzerland 1,110; Austria 427; China 427.
Ash and residue containing zinc		36,331	--	Belgium 18,100; Netherlands 14,300; France 3,090.
Metal, including alloys:				
Alloys, all forms		30,115	--	Austria 11,900; Italy 3,400; Czech Republic 2,530.
Unalloyed		81,664	--	France 25,800; United Kingdom 21,300; Austria 10,300.
Scrap		55,913	--	Belgium 16,400; China 14,800; India 6,320.
Zirconium:				
Ore and concentrate		5,044	--	Belgium 3,570; Austria 298.
Metal, including alloys		38	16	Japan 6; Canada 4; France 3.
INDUSTRIAL MINERALS				
Abrasives, natural:				
Corundum, emery, garnet, etc.		4,546	--	Sweden 1,677; Switzerland 886; Netherlands 659.
Pumice		102,274	--	Netherlands 47,100; Luxembourg 41,300; Switzerland 716.
Asbestos, crude		< 1	100%	--
Barite and witherite		32,375	--	Unspecified, 100%.
Borates, natural, crude, including calcined		30	--	Czech Republic 13; Switzerland 9; South Africa 7.
Cement	thousand metric tons	6,238	--	Netherlands 2,240; Belgium 823; France 412.
Chalk, natural		137,812	--	Netherlands 49,900; Sweden 18,300; Denmark 17,800.
Clays, crude:				
Bentonite		71,977	--	Austria 13,500; Switzerland 13,200; France 12,600.
Kaolin		301,870	--	Italy 80,300; Austria 79,400; Switzerland 42,000.
Other, unspecified	thousand metric tons	2,434	--	Italy 881; Netherlands 825; Belgium 299.
Diamond, natural:				
Gem, not set or strung	carats	164,393	20,500	Thailand 27,600; Hong Kong 22,500; Israel 13,200.
Industrial stones	do.	5,186	--	Switzerland 2,020; Austria 1,660; Belgium 534.
Dust and powder	kilograms	2,984	--	Austria 582; Ireland 430; Thailand 325.
Diatomite and other infusorial earth		7,611	--	Austria 2,760; Poland 655; Netherlands 533.
Feldspar		113,329	--	France 60,700; Italy 16,000; Czech Republic 8,730.
Fluorspar:				
Acid-grade		11,323	--	Sweden 2,510; Hungary 1,530; Poland 1,440.
Metallurgical-grade		12,738	--	Denmark 2,290; Spain 2,280; Czech Republic 2,230.
Graphite, natural		14,241	--	Czech Republic 3,770; France 1,990; Austria 1,170.
Gypsum and anhydrite, natural	thousand metric tons	1,252	--	Belgium 310; Norway 212; Netherlands 185.
Kyanite and related materials:				
Andalusite, kyanite, sillimanite		2,214	--	Hungary 759; Italy 467; Poland 166.
Mullite		9,977	2,960	United Kingdom 2,270; Italy 1,800; Hungary 1,250.
Lime, hydrated	thousand metric tons	955	--	Netherlands 631; Belgium 95; France 81.
Magnesium compounds:				
Magnesite, crude, including burned		81,082	--	France 29,400; Austria 20,500; Slovakia 7,300.
Epsomite		760,490	--	France 171,000; Malaysia 165,000; Indonesia 119,000.
Mica, crude, including splittings and waste		3,656	--	Brazil 1,200; Italy 669; Austria 548.
Peat, natural	thousand metric tons	2,007	--	Netherlands 885; France 237; Italy 177.
Phosphates:				
Crude		5,045	--	Belgium, 100%.
Milled		3	--	Austria 3; Poland < 1.
Precious and semiprecious gemstones, natural (other than diamond):		438	--	India 129; Hong Kong 102; Thailand 46.
Pyrite, unroasted		240	--	France 165; Turkey 40; Czech Republic 22.
Salt and brine	thousand metric tons	3,373	--	Belgium 904; Netherlands 580; Czech Republic 381.

See footnotes at end of table.

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TABLE 3—Continued
GERMANY: EXPORTS OF SELECTED MINERAL COMMODITIES IN 2005[1]

(Metric tons unless otherwise specified)

Commodity		Total	Destinations[e] United States	Other (principal[2])
INDUSTRIAL MINERALS—Continued				
Stone, sand and gravel:				
Basalt, lava rocks, etc.		263,860	--	Netherlands 242,000; Switzerland 18,700.
Dimension stone:				
Dolomite and limestone	thousand metric tons	730	--	Luxembourg 529; Netherlands 69; Belgium 45.
Granite		66,453	--	Switzerland 60,300.
Marble, travertine, etc.		178,347	--	Switzerland 71,500; Netherlands 39,600; Belgium 26,800.
Foundation sand and gravel		158,268	--	Austria 66,900; Switzerland 62,800; France 18,700.
Limestone for cement		165,383	--	Luxembourg 135,000; Belgium 11,600; France 8,430.
Quartz and quartzite		39,220	--	Netherlands 9,810; Austria 5,260; Czech Republic 4,590.
Quartz sand	thousand metric tons	8,670	--	Netherlands 6,030; Belgium 1,460.
Sandstone		7,958	--	Netherlands 5,670; Austria 708; United Arab Emirates 549.
Schist and shale		18,422	--	Belgium 9,160; Netherlands 4,050; Denmark 3,060.
Unworked stone, natural	thousand metric tons	9,194	--	Netherlands 5,880; Belgium 1,280; Switzerland 818.
Other natural stone, unspecified	do.	5,343	--	Netherlands 3,920; Switzerland 358; France 347.
Sulfur, crude, including native and byproduct	do.	899	--	Morocco 210; Senegal 106; Poland 76.
Talc, steatite, soapstone, pyrophyllite		3,906	--	Romania 726; France 590; Denmark 434.
Vermiculite, perlite, chlorite		3,145	--	Belgium 686; Poland 497; Austria 494.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural		134,091	--	Austria 23,600; Luxembourg 16,800; France 15,400.
Coal:				
Anthracite		11,103	--	Israel 5,020; Belgium 1,390; Austria 1,270.
Lignite	thousand metric tons	34	--	Austria 31.
Other bituminous, including briquets		284,861	--	France 111,000; Belgium 79,500; Poland 75,500.
Coke:				
Of anthracite and bituminous coal		75,085	--	United Kingdom 28,700; Netherlands 14,300; Austria 9,090.
Of lignite		8,227	--	Austria 5,550; Canada 1,490; Japan 658.
Gas, natural, gaseous	thousand metric tons	13,771	--	Unspecified, 100%.
Petroleum, crude	do.	1,258	--	United Kingdom 1,220.
Uranium, natural:				
Crude, U content	kilograms	65,930	--	France 64,000.
Enriched, fissile isotopes	do.	9,223	5,710	Belgium 1,620; France 489; Finland 479.

[e]Estimated; estimated tonnages are rounded to no more than three significant digits; may not add to totals shown. -- Less than 5%.
[1]Source: Bundesanstalt für Geowissenschaften und Rohstoffe, 2006, Table1.2—Rohstoffsituation, 2005: Hannover, Germany, October.
[2]Destination country was estimated to have accounted for at least 5% of Germany's total exports of the mineral commodity.

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TABLE 4
GERMANY: IMPORTS OF SELECTED MINERAL COMMODITIES IN 2005[1]

(Metric tons unless otherwise specified)

Commodity		Total	Sources[e] United States	Other (principal[2])
METALS				
Aluminum:				
Bauxite, ore and concentrate	thousand metric tons	2,435	--	Guinea 1,920; Australia 134.
Oxides	do.	1,000	--	Jamaica 465; Ireland 178; France 86.
Hydroxides		231,124	--	Ireland 117,000; Iran 25,000; Hungary 19,000.
Ash and residue containing aluminum		156,965	--	Netherlands 46,800; France 44,100; Denmark 18,400.
Metal, including alloys:				
Primary, not alloyed	thousand metric tons	649	--	Russia 151; Iceland 112; Brazil 97.
Primary, alloys, all forms	do.	690	--	Netherlands 175; Norway 149; United Kingdom 109.
Secondary		431,665	--	United Kingdom 129,000; Austria 46,200; Netherlands 40,100.
Scrap		438,066	--	Netherlands 94,200; France 49,500; Switzerland 46,900.
Antimony:				
Metal, including alloys, all forms		146	--	China 106; Vietnam 20; Russia 17.
Scrap		1	--	China, 100%.
Arsenic, metal, including alloys, all forms		2	--	China 2; Japan < 1.
Bismuth, metal, including alloys, all forms		1,489	--	United Kingdom 969; Mexico 404; Belgium 85.
Chromium, ore and concentrate		141,483	--	South Africa 93,200; Turkey 34,700.
Cobalt:				
Oxides and hydroxides		542	--	Finland 272; Belgium 78; Italy 74.
Metal, including alloys, all forms		2,256	239	Canada 329; Russia 314; Belgium 305.
Scrap		230	21	Netherlands 45; South Africa 33; Switzerland 28.
Copper:				
Ore and concentrate	thousand metric tons	1,149	--	Chile 412; Peru 213; Argentina 201.
Matte and speiss, including cement copper		27,618	--	Brazil 16,100; Chile 5,050; Romania 3,370.
Ash and residue containing copper		47,524	3,660	Italy 11,500; Ukraine 6,940; Netherlands 5,800.
Metal, including alloys:				
Unrefined		36,671	--	Armenia 9,500; Chile 5,980; Peru 4,660.
Refined, not alloyed	thousand metric tons	625	--	Russia 227; Chile 143; Poland 101.
Alloys, all forms		26,657	--	United Kingdom 6,000; Belgium 4,210; Poland 3,970.
Scrap		432,147	--	France 67,000; Netherlands 44,900; United Kingdom 38,500.
Gallium, indium, and thallium, metal, including scrap		25	4	United Kingdom 6; China 5; France 3.
Germanium, oxides		2,349	312	France 829; China 533; United Kingdom 331.
Gold:				
Metal, including alloys, all forms	kilograms	29	9	France 11; Switzerland 4; United Kingdom 3.
Waste and sweepings		1,926	--	United Kingdom 435; Austria 424; Australia 339.
Iron and steel:				
Ore and concentrate	thousand metric tons	39,061	--	Brazil 21,800; Sweden 5,390; Canada 5,230.
Pyrite, roasted		20,496	--	Norway 19,800.
Ash and residue containing iron		185,409	--	Austria 156,000; Luxembourg 23,500.
Metal:				
Pig iron, cast iron, related materials		320,422	--	Russia 167,000; South Africa 58,000; Canada 29,500.
Scrap	thousand metric tons	5,273	--	Netherlands 1,200; Poland 796; Czech Republic 733.
Sponge iron, powder		156,048	--	Canada 58,800; Sweden 29,200; Trinidad & Tobago 21,400.
Ferroalloys:				
Ferrochromium		454,703	--	South Africa 295,000; Netherlands 55,900; Kazakhstan 35,500.
Ferromanganese		170,967	--	South Africa 56,800; France 36,900; Spain 30,800.
Ferromolybdenum		15,594	--	Belgium 7,310; Armenia 2,150; United Kingdom 1,330.
Ferronickel		157,091	--	United Kingdom 62,800; Greece 36,900; Venezuela 31,700.
Ferrosilicochromium		1,429	--	Russia 822; South Africa 422; China 186.
Ferrosilicomagnesium		6,831	--	Norway 4,600; Slovenia 1,560; Argentina 417.
Ferrosilicomanganese		172,967	--	Norway 47,900; Ukraine 32,500; China 22,800.
Ferrosilicon		238,120	--	Norway 58,300; France 36,200; Poland 32,900.
Ferrotungsten		600	--	China 463; Netherlands 49.
Ferrotitanium		10,302	--	Russia 3,470; United Kingdom 2,660; Netherlands 1,960.

See footnotes at end of table.

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TABLE 4—Continued
GERMANY: IMPORTS OF SELECTED MINERAL COMMODITIES IN 2005[1]

(Metric tons unless otherwise specified)

Commodity		Total	Sources[e] United States	Other (principal[2])
METALS—Continued				
Iron and steel, metal, ferroalloys—Continued:				
Ferrovanadium		4,843	--	Austria 2,700; Russia 1,210.
Ferroniobium		4,361	--	Brazil 3,580; Canada 593.
Other ferroalloys		68,205	--	France 25,200; United Kingdom 9,000; Italy 8,120.
Steel, crude		13,918	--	Czech Republic 6,330; Poland, 1,780; United Kingdom 1,530.
Lead:				
Ore and concentrate		171,533	--	Australia 42,400; Sweden 36,900; Ireland 29,700.
Lead containing antimony		14,696	--	Sweden 5,140; Belgium 4,010; Ukraine 1,540.
Metal, including alloys:				
Alloys, all forms		13,332	--	United Kingdom 4,810; France 2,280; Netherlands 2,200.
Refined		70,209	--	United Kingdom 19,700; Belgium 17,600; Poland 12,600.
Unrefined		10,296	--	Poland 4,970; Switzerland 2,030; United Kingdom 1,080.
Scrap		74,054	--	Belgium 25,000; United Kingdom 24,900; Netherlands 4,740.
Lithium:				
Carbonate		8,097	785	Chile 7,030.
Oxides and hydroxides		4,209	943	Switzerland 2,850; Russia 244.
Magnesium, metal, including alloys:				
Scrap		19,996	--	China 11,500; Austria 3,940; Switzerland 1,980.
Unwrought		42,806	--	China 21,500; Czech Republic 5,350; Norway 5,090.
Manganese, ore and concentrate		7,645	--	Netherlands 3,660; France 1,450; Brazil 1,090.
Mercury		36	4	Spain 21; Finland 6.
Molybdenum, ore and concentrate		11,537	2,620	Belgium 1,950; China 1,880; Chile 1,750.
Nickel:				
Matte, speiss, related materials		6,902	--	Netherlands 6,860.
Oxides and hydroxides		502	--	Czech Republic 157; Canada 118; Belgium 80.
Ash and residue containing nickel		8,206	911	Netherlands 2,830; France 935; Singapore 615.
Metal, including alloys:				
Alloys, all forms		2,182	133	United Kingdom 1,130; Austria 454; Belgium 116.
Unalloyed		87,939	--	Russia 35,600; United Kingdom 27,100; Norway 10,600.
Scrap		11,672	969	Austria 2,520; United Kingdom 1,140; France 1,020.
Niobium (columbium):				
Ore and concentrate, including tantalum		79,274	--	Unspecified, 100%.
Scrap containing both niobium and tantalum		401	--	Malaysia 171; Belgium 137; Rwanda 47.
Platinum-group metals:				
Waste and sweepings		6,575	796	South Africa 1,100; Austria 414; United Kingdom 355.
Metal, including alloys, all forms:				
Platinum	kilograms	46,420	5,760	South Africa 15,400; Belgium 12,300; United Kingdom 7,610.
Palladium	do.	45,278	3,120	Belgium 18,400; United Kingdom 8,330; South Africa 5,570.
Rhodium	do.	5,829	869	Belgium 3,050; United Kingdom 717; South Africa 490.
Iridium, osmium, and ruthenium	do.	4,217	384	South Africa 1,560; United Kingdom 810; Russia 443.
Rare-earth metals, including alloys:				
Metal		402	--	China 234; Austria 116; Belgium 25.
Compounds, all forms		1,082	--	China 540; France 278; Austria 156.
Selenium, elemental		225	--	Canada 45; Uzbekistan 43; Russia 40.
Silicon, metal		156,690	--	Norway 63,100; Brazil 48,600; France 16,300.
Tin:				
Ore and concentrate		2	--	Switzerland, 100%.
Ash and residue containing tin		1,011	--	Netherlands 761; Belgium 173.
Metal, including alloys		20,992	--	Peru 4,810; Indonesia 4,050; Thailand 3,630.
Scrap		506	--	Netherlands 175; France 119; Slovakia 39.
Titanium, ore and concentrate		558,278	--	Norway 232,000; Canada 154,000; South Africa 142,000.
Tungsten:				
Ore and concentrate		493	--	Brazil 128; Thailand 124; Canada 77.

See footnotes at end of table.

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TABLE 4—Continued
GERMANY: IMPORTS OF SELECTED MINERAL COMMODITIES IN 2005[1]

(Metric tons unless otherwise specified)

Commodity		Total	Sources[e] United States	Other (principal[2])
METALS—Continued				
Tungsten—Continued:				
Metal, including alloys:				
Metal		2,066	196	Austria 791; Canada 593; China 140.
Scrap		3,329	613	United Kingdom 449; Austria 396; Russia 306.
Wolframite		857	448	China 200; Ireland 166.
Vanadium, oxides and hydroxides		741	--	China 250; Unspecified 247; Australia 157.
Zinc:				
Ore and concentrate		401,829	54,600	Ireland 110,000; Peru 66,300; Sweden 61,900.
Matte and related materials		17,703	--	Netherlands 4,510; Belgium 2,730; France 2,090.
Blue powder		6,126	349	Belgium 3,640; Norway 1,420; United Kingdom 337.
Ash and residue containing zinc		22,066	1,810	Netherlands 4,770; Switzerland 4,390; France 2,890.
Metal, including alloys:				
Alloys, all forms		76,981	--	Belgium 49,700; France 9,550; Finland 6,770.
Unalloyed		245,794	--	Spain 81,100; Finland 61,400; Netherlands 47,700.
Scrap		22,480	--	France 8,450; Netherlands 6,160; Denmark 2,230.
Zirconium, metal, including alloys		145	--	Netherlands 100; France 31.
INDUSTRIAL MINERALS				
Abrasives, natural:				
Corundum, emery, garnet, and so forth		11,062	--	India 7,410; Netherlands 1,080; United Kingdom 985.
Pumice		166,223	--	Italy 139,000; Iceland 25,800.
Asbestos, crude		98	--	Canada 73; South Africa 18; Zimbabwe 7.
Barite and witherite		231,471	--	China 156,000; France 31,500; Bulgaria 27,100.
Borates, natural, crude, including calcined		9,102	--	Turkey 3,450; Belgium 2,920; Netherlands 2,410.
Cement	thousand metric tons	1,605	--	France 371; Belgium 355; Czech Republic 300.
Chalk, natural		251,539	--	Netherlands 130,000; France 54,600; Belgium 42,000.
Clays, crude:				
Bentonite		253,226	--	Netherlands 109,000; Italy 40,500; Czech Republic 38,500.
Kaolin	thousand metric tons	803	194	Netherlands 215; Czech Republic 138; United Kingdom 133.
Other, unspecified		157,146	25,100	Czech Republic 47,900; Luxembourg 21,400; United Kingdom 17,000.
Diamond, natural:				
Gem, not set or strung	carats	432,555	--	Belgium 154,000; India 153,000; Israel 44,600.
Industrial stones	thousand carats	1,076	--	United Kingdom 513; Ireland 273; Belgium 173.
Dust and powder	kilograms	9,567	1,510	Ireland 4,250; China 1,000; Ukraine 555.
Diatomite and other infusorial earth		87,236	11,300	Spain 36,000; Denmark 16,800; Netherlands 10,500.
Feldspar		101,931	--	France 38,100; Turkey 18,600; Norway 17,600.
Fluorspar:				
Acid-grade		245,089	--	South Africa 96,100; Namibia 57,100; China 42,600.
Metallurgical-grade		19,806	--	China 16,300; South Africa 3,070.
Graphite, natural		55,843	--	China 19,600; Netherlands 16,400; Unspecified 11,600.
Gypsum and anhydrite, natural		140,238	--	France 53,600; Austria 51,700; Netherlands 16,000.
Kyanite and related materials:				
Andalusite, kyanite, sillimanite		52,574	--	South Africa 24,300; France 15,000; Belgium 5,470.
Mullite		5,473	662	Hungary 2,440; United Kingdom 1,640; Canada 465.
Lime, hydrated	thousand metric tons	298	--	France 121; Czech Republic 86; Belgium 51.
Magnesium compounds:				
Magnesite, crude, including burned		521,442	--	China 279,000; Netherlands 78,700; Slovakia 26,600.
Epsomite		299	--	Netherlands 144; Belgium 101; France 54.
Mica, crude, including splittings and waste		32,009	--	India 11,700; France 9,440; Netherlands 3,390.
Peat, natural		285,308	--	Netherlands 90,700; Latvia 68,500; Estonia 49,400.
Phosphates:				
Crude		86,903	--	Israel 69,400; Russia 15,000.
Milled		17,432	--	Belgium 16,000.

See footnotes at end of table.

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TABLE 4—Continued
GERMANY: IMPORTS OF SELECTED MINERAL COMMODITIES IN 2005[1]

(Metric tons unless otherwise specified)

Commodity		Total	Sources[e] United States	Other (principal[2])
INDUSTRIAL MINERALS—Continued				
Precious and semiprecious stones, natural (other than diamond):				
Gem, not set or strung		1,406	--	Brazil 800; Madagascar 152; China 87.
Industrial stones	grams	3,500	900	China 2,600.
Pyrite, unroasted		62,686	--	Finland 59,700.
Salt and brine	thousand metric tons	2,559	--	Netherlands 1,990; United Kingdom 131.
Stone, sand and gravel:				
Basalt, lava rocks, and so forth		68,572	--	Norway 33,100; Italy 15,200; Netherlands 7,060.
Dimension stone:				
Dolomite and limestone		614,711	--	Belgium 273,000; Estonia 267,000.
Granite		136,889	--	Poland 28,300; Norway 13,700; Portugal 12,600.
Marble, travertine, and so forth	thousand metric tons	3,101	--	Norway 1,740; Austria 896; Italy 248.
Foundation sand and gravel		22,562	--	Switzerland, 100%.
Limestone for cement	thousand metric tons	1,876	--	Belgium 625; Poland 525; Austria 490.
Quartz and quartzite		78,977	--	Austria 34,000; Brazil 16,800; Sweden 9,000.
Quartz sand	thousand metric tons	1,590	--	France 871; Netherlands 294; Austria 162.
Sandstone		21,670	--	India 6,720; Poland 6,460; Italy 1,710.
Schist and shale		29,224	--	France 24,800.
Natural stones, unworked	thousand metric tons	1,183	--	France 1,010; Netherlands 75.
Other natural stone, unspecified	do.	6,259	--	Norway 3,290; United Kingdom 1,510; Sweden 444.
Sulfur, crude, including native and byproduct		46,127	--	Belgium 10,200; Netherlands 9,730; Norway 7,060.
Talc, steatite, soapstone, pyrophyllite		376,618	--	Netherlands 121,000; France 91,900; Austria 76,800.
Vermiculite, perlite, chlorite		97,031	--	Greece 67,100; Hungary 16,800; South Africa 11,000.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural		34,095	6,270	Denmark 5,730; Switzerland 5,180; Trinidad & Tobago 5,050.
Coal:				
Bituminous:				
Anthracite	thousand metric tons	992	50	Russia 424; Belgium 143; Ukraine 69.
Coke	do.	4,926	--	Poland 1,170; Australia 1,150; China 1,030.
Semicoke, coking coal	do.	5,284	1,140	Australia 1,960; Canada 1,510; Russia 481.
Other, including briquets	do.	24,178	--	South Africa 6,120; Poland 5,970; Russia 5,630.
Lignite	do.	112	--	Czech Republic 106.
Coke of lignite		60	--	Australia, 100%.
Gas, natural, gaseous	do.	76,144	--	Unspecified, 100%.
Petroleum, crude	do.	113,068	--	Russia 37,100; United Kingdom 19,300; Norway 16,800.
Uranium, natural:				
Crude, U content		1,942	--	Canada 889; United Kingdom 633; France 252.
Enriched, fissile isotopes	kilograms	14,989	--	France 6,030; Russia 4,510; Netherlands 2,590.

[e]Estimated; estimated tonnages are rounded to no more than three significant digits; may not add to totals shown. -- Less than 5%.
[1]Source: Bundesanstalt für Geowissenschaften und Rohstoffe, 2006, Table1.1—Rohstoffsituation, 2005: Hannover, Germany, October.

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The Mineral Industry of Greece

By Harold R. Newman

The mineral industry, which consisted of the sectors that mine and process metallic and nonmetallic minerals and mineral fuels, was a small but important segment of the Greek economy. The majority of Greek mining companies were well organized and well developed, and they had a strong export orientation. High metal prices in world markets supported the Greek mineral industry in 2006. The industrial minerals sector was only slightly less well developed than the metallic mineral sector.

Minerals in the National Economy

The metallic minerals sector involved a relatively small number of large, capital-intensive companies that were, in some cases, vertically integrated and engaged in both mining and metallurgical processing. Typical examples were Aluminium de Grèce S.A., (AdG) a producer of bauxite, alumina and aluminum, and Larco G.M.M. S.A. (Larco), which mined laterite and operated the ferronickel plant at Larymna. Larco was the sole manufacturer of ferronickel in the European Union (EU).

Greece was a major global supplier of several key industrial minerals, notably bentonite, magnesite, and perlite. The country's position as a leading producer of these minerals was well-established. S&B Industrial Minerals S.A. (S&B) was Greece's—and one of the world's—leading producers of industrial minerals. Composed of five divisions (the Bauxite, Bentonite, Fluxes, Perlite, and Specialty Minerals Divisions), the company had facilities around the globe; its main mining and processing operations, however, were located in Greece (Industrial Minerals, 2006).

Production

Because northern Greece was thought to contain a significant amount of exploitable mineral resources, it received the most attention for exploration activity of anywhere else in the country. Mining companies renewed exploration funding in 2006, which indicated their optimism about future production. In 2006, activities continued to be directed toward the search for gold. The country's mineral production levels were more or less the same as in 2005. In terms of the value of production, bauxite was the most important of Greece's mineral commodities, although production declined by about 11% in 2006. Greece continued to be a leading producer of bauxite, magnesite, nickel, and perlite in the EU (table 1). Production of mineral commodities in Greece was closely tied to the export market. About 50% of the country's mineral production was exported.

Structure of the Mineral Industry

The major mineral commodities and the companies that produced them in 2006 are listed in table 2. There was little change from 2005, although the Government was continuing to move toward the privatization of some state enterprises.

Commodity Review

Metals

Bauxite and Alumina.—Greece was a leading bauxite producer in the EU. Bauxite is the principal raw material used in the production of alumina. The major bauxite deposits are located in central Greece within the Parnassos-Ghiona geotectonic zone and on Evoia Island. S&B leased and owned mines in these regions and controlled the most significant bauxite reserves, in terms of size, in Europe.

Greece's bauxite reserves were of the diasporic and boehmitic type. Although the bauxite ore had an average aluminum oxide content of 53%, it also had a high silica content that made it hard to process. Production was distributed between open pit and underground mining. The recovery rate for all the bauxite mined was about 85%. The bauxite was used as raw material for the production of alumina. About 10% of the production of bauxite was nonmetallurgical grade (S&B Industrial Minerals S.A., 2006a).

AdG and S&B announced that a new agreement was reached to supply the AdG alumina plant with bauxite from S&B's mines. The new 10-year agreement covered the period from January 1, 2007, to December 31, 2016. According to the agreement, AdG commissioned S&B to supply its plant with 700,000 metric tons per year (t/yr) of bauxite, a quantity significantly larger than the 400,000 t/yr provided under the existing contract. Moreover, the new contract included an option for an additional 70,000 t/yr of bauxite, depending on the needs of AdG (S&B Industrial Minerals S.A., 2006c).

Gold.—European Goldfields Ltd. held a 95% interest in Hellas Gold S.A., which owned three gold and base-metal deposits in northern Greece. These were the Olympias deposit, which contains gold, lead, silver, and zinc; the Skouries copper/gold deposit; and the polymetallic Stratoni deposit. Hellas Gold started production at Stratoni in late 2005 and continued in 2006, which resulted in higher production of lead and silver than in 2005. Hellas Gold sold an existing stockpile of gold concentrates at Olympias in July 2006. The company also applied for permits to develop the Olympias and Skouries projects (European Goldfields Ltd., 2006).

The total estimated proven and probable reserves at Stratoni in 2006 were 1.9 million metric tons (Mt) at grades of 8.1% lead, 190 grams per metric ton (g/t) silver, and 10.8% zinc. Production of ore was expected to reach 170,000 metric tons (t) by the end of 2006 and to increase steadily to 400,000 t/yr by 2010. Based on historical production levels, the Stratoni Mine was expected to produce at grades of between 8% and 10% lead, 200 g/t silver and 8% to 10% zinc, with concentrator metals recovery of about 90% (European Goldfields Ltd., 2007).

Nickel.—Larco was among the leading ferronickel producers in the world and the only producer of nickel in Europe that used domestic nickel ores. Larco had three main mining areas—Evia

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(open pit), with annual production of about 1.5 Mt of ore; Agios Ioannis (underground), with an annual production of about 700,000 t of ore; and Kastoria (open pit), with annual production of about 300,000 t. The Larymna metallurgical plant consisted of four rotary kilns, five electric arc furnaces, and two converters with a metal production capacity of 50 t each. The 17,736 t of ferronickel produced in 2006 was sold to Acerinox S.A. of Spain, ArcelorMittal Group of Luxembourg, Outokumpu oyj of Finland, and ThyssenKrupp AG of Germany, based on long-term contracts. In 2006, Glencore S.A. was added to Larco's customer portfolio (Larco G.M.M S.A., 2006, p. 16.).

European Nickel plc announced in September that it had signed an agreement with Larco to deliver 200,000 t of nickel ore from its Çaldag Mine in Turkey to Larco's smelter at Larymna. Shipments to Larco would take place over a period of 12 months. Some 49,000 t had been shipped by year's end (European Nickel plc, 2006).

Industrial Minerals

Cement.—Heracles General Cement S.A., a member of the Lafarge Group, had three cement plants. One of these plants, located in Volos, was the largest-capacity cement plant in Europe [4.6 million metric tons per year (Mt/yr)]; the other plants were located in Halkis Evia and Milaki Evia. The total combined production capacity of the three plants was 9.6 Mt/yr. Heracles was the leading processor of raw material and producer of cement and clinker in Greece. Heracles was also active in the production and sale of ready-mix and aggregate products (Google Finance, 2006).

Clay and Shale.—S&B Industrial Minerals S.A. was the leading bentonite producer in Europe, the world's second ranked producer after the United States, and the leading bentonite supplier worldwide. S&B remained focused on supplying bentonite for foundries and the drilling industry. S&B's reserves were located on the island of Milos (S&B Industrial Minerals S.A., 2006a).

Gypsum.—Lava Mining and Quarrying Co.'s anhydrite and gypsum quarry is located at Altsi on the island of Crete. Quarrying was carried out using explosives, and the quarried material was fed to trucks by means of loaders and then transported to the crushing plant. The production capacity of the quarry was 500,000 t. The end product that came from the plant consisted of anhydrite and hydratous gypsum that was used in the production of cement (Lava Mining and Quarrying Co., 2006a).

Magnesium Compounds.—Grecian Magnesite S.A. (GM) was the leading magnesite exporter in Europe and the only active magnesite operation in Greece in 2006. GM's open pit mine and plant were located southeast of Thessaloniki in the Chalkidiki region. After mining, the material was processed, beneficiated, and fed into rotary or shaft kilns. GM produced and marketed caustic calcined magnesite, dead-burned magnesia, and raw magnesite. In 2006, GM extracted about 2.5 Mt of crude run-of-mine material to produce 200,000 t of magnesium oxide, about 97% of which was exported (Grecian Magnesite S.A., 2006).

Perlite.—With a production capacity of 650,000 t/yr, S&B was the leading producer of raw perlite worldwide and the leader in the European market for perlite used in building materials, cyrogenics, formed products, and horticulture, and as filter aids. S&B mined perlite at Provatas, Thachylas, and Tsigrado on Milos Island (S&B Industrial Minerals S.A., 2006d).

Pumice and Pumicite.—Lava Mining and Quarrying's pumice deposit was located on the island of Yali and had been formed by volcanic action of the adjacent volcano at Nissiros. Quarrying of the deposit was performed without the use of explosives. Bulldozers fed a series of belt conveyors, screens, and crushers, which fed a graded product to stockpiles. Thereafter, a second series of belt conveyors fed ships with carrying capacities of up to 30,000 t, at a loading rate of 1,000 t per hour (Lava Mining and Quarrying Co., 2006c).

Silica.—Lava Mining and Quarrying extracted microcrystalline quartz from its quarry on Milos island. The quarry is located 12 kilometers (km) southeast of Adamas. Exploitation of the quarry was performed by bulldozer; the quartz was transported by track to the processing plant for screening and crushing to the required grades. The production capacity of the plant was 150,000 t/yr; reserves at the quarry were estimated to be 10 Mt. The medium-term objective of the company was to produce a fine grade size. A pilot plant was established near Athens for the production of pure, very fine graded material to provide samples to potential customers (Lava Mining and Quarrying S.A., 2006b).

Stone, Dimension.—In 2006, the Greek marble industry continued to play a leading role in the international market as a result of continued marble production in almost all areas of the country, the variety of possible uses of the marble, and the many colors available (ash, black, brown, green, pink, red, and multicolored). The marble industry was active in the quarrying, processing, and sale of blocks and finished products.

Mineral Fuels and Other Sources of Energy

Coal.—Lignite (brown coal) is Greece's only significant fossil fuel resource, with estimated reserves of 3,900 Mt. Public Power Corporation (PPC) was Greece's major producer of lignite, which was the predominant fuel used for electricity generation in Greece. Most PPC lignite was produced from the Ptolemais-Amyntaion Basin; lesser amounts were produced from the Megalopolis Basin. Because the country has no hard coal (black coal) reserves, it imported hard coal from, in descending order of amount imported, South Africa, Russia, Venezuela, and Colombia. Lignite accounted for about 65% of the raw material for the country's power generation (U.S. Energy Information Administration, 2006a).

Natural Gas and Petroleum.—With Greece's limited natural gas reserves and petroleum resources, production was negligible. Its Mediterranean location, however, makes it conveniently close to several important producing regions, such as the Caspian Sea area, the Middle East, and North Africa.

The Bulgarian, Greek, and Russian Governments had signed a memorandum of understanding in 2005 for the construction of a pipeline that would stretch 280 km from the Bulgarian port

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of Burgas on the Black Sea to Greece's Alexandroupolis on the Aegean Sea. An intergovernmental agreement to build the oil pipeline to bypass some of the world's busiest shipping lanes was expected to be signed by yearend 2006. The project, which was expected to cost about $800 million, would allow Russia to export oil through the Black Sea, bypassing the busy Bosporus Strait in Turkey. The annual initial throughput capacity would be 255 million barrels before rising to 370 million barrels, depending on demand requirements (Alexander's Gas & Oil Connections, 2006).

Renewable Energy.—To meet EU mandates, renewable electricity generation projects were on the rise in Greece. The country planned to have renewable energy sources make up 20% of its energy needs by 2010 compared with 10% in 2006. Greek wind farm operator Rokas S.A. announced that it would invest $3.1 billion in a wind farm and power transmission system. Rokas planned to install 44 wind parks with a combined generating capacity of 1,363 megawatts (MW). The project would be one of the biggest investments in renewable energy in the world. In 2006, Greece had 475 MW of installed wind-power capacity, with Rokas accounting for 40% of that capacity (U.S. Energy Information Administration, 2006b).

Outlook

Greece is expected to remain a major supplier of industrial minerals in the international market. Mineral exploration activities in Greece will be intensified to secure additional high-quality reserves. The Government could be involved in planning investment programs to improve the existing installations and lower operating costs.

References Cited

Alexander's Gas & Oil Connections, 2006, Balkan pipeline deal to be signed by end of 2006: Alexander's Gas & Oil Connections, August 30. (Accessed October 23, 2007, at http://www.gasandoil.com/goc/news/nte63969.htm.)

European Goldfields Ltd., 2006, Olympias gold concentrates sold to Celtic Resources: European Goldfields Ltd. news release, November 22, 2 p. (Accessed October 21, 2007, at http://www.egoldfields.com/goldfields/uploads/press/NewsRelease-OlympiasConcentratesCeltic.pdf.)

European Goldfields Ltd., 2007, Stratoni Mine exceeds production target for 2006—Increase in Stratoni reserves: European Goldfields Ltd., January 8, 3 p. (Accessed October 21, 2007, at http://www.egoldfields.com/goldfields/uploads/press/NewsRelease-TradingUpdateQ42006.pdf.)

European Nickel plc, 2006, Mining starts at Çaldag: European Nickel plc news release, September 11, 2 p. (Accessed October 22, 2007, at http://www.enickel.co.uk/__data/assets/pdf_file/0014/12731/european_nickel_plc_mining_starts_at_caldag_200,000_tonne_ore_sales_contract_signed,_11_sept_2006.pdf.)

Google Finance, 2006, Heracles General Cement Company: Google Finance. (Accessed October 22, 2007, at http://finance.google.com/finance?q=ATH:HRAK.)

Grecian Magnesite S.A., Overview of Grecian Magnesite: Grecian Magnesite S.A. news bulletin, May 30. (Accessed October 22, 2007, at http://www.grecianmagnesite.com/flash/english/news/300506.htm.)

Industrial Minerals, 2006, Greek minerals supply: Industrial Minerals, June, p. 26.

Larco G.M.M. S.A., 2006, Commercial activities review, *in* Activity and performance review 2006, 44 p. (Accessed October 21, 2007, at http://www.larco.gr/content/LarcoAnnualReport_em.pdf.)

Lava Mining and Quarrying Co., 2006a, Anhydrite gypsum quarry: Lava Mining and Quarrying Co. (Accessed October 22, 2007, at http://www.lava.gr/EN/08-01-Gipsos.asp.)

Lava Mining and Quarrying Co., 2006b, Microcrystalline quartz: Lava Mining and Quarrying Co. (Accessed October 23, 2007, at http://www.lava.gr/EN/06-01-Piritiko.asp.)

Lava Mining and Quarrying Co., 2006c, Pumice: Lava Mining and Quarrying Co. (Accessed August 28, 2006, at http://www.lava.gr/EN/02-01-Elaf.asp.)

S&B Industrial Minerals S.A., 2006a, Bauxite: S&B Industrial Minerals S.A. (Accessed October 20, 2007, at http://www.sandb.com/en/main_in.html?title_voksitisGr.gif?boxitis_boxitis.html.)

S&B Industrial Minerals S.A., 2006b, Bentonite: S&B Industrial Minerals S.A. (Accessed May 10, 2006, at http://www.sandb.com/en/main_in.html?title_bentonitis.gif?bentonitis_bentonitis.html.)

S&B Industrial Minerals S.A., 2006c, New ten year agreement between Aluminium de Grece and S&B Industrial Minerals S.A.: S&B Industrial Minerals S.A. press release, May 15, 1 p. (Accessed October 20, 2007, at http://www.sandb.com/en/deltia_tipou/15_05_06.pdf.)

S&B Industrial Minerals S.A., 2006d, Perlite: S&B Industrial Minerals S.A. (Accessed October 22, 2007, at http://www.sandb.com/en/main_in.html?title_peritis.gif?perlitis_perlitis.html.)

U.S. Energy Information Administration, 2006a, Greece—Coal: U.S. Energy Information Administration. (Accessed October 23, 2007, at http://www.eia.doe.gov/emeu/cabs/Greece/Full.html.)

U.S. Energy Information Administration, 2006b, Greece—Renewable energy: U.S. Energy Information Administration, p. 7. (Accessed October 23, 2007, at http://www.eia.doe.gov/emeu/cabs/Greece/Full.html.)

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TABLE 1
GREECE: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2002	2003	2004	2005	2006[e]
METALS						
Aluminum:						
Bauxite		2,468,865	2,442,312	2,396,065 r	2,441,443 r	2,162,900
Alumina, Al_2O_3		749,500	758,800	786,000 r	782,000 r	775,000
Metal:						
Primary		165,262	167,797	167,300	163,286 r	164,800
Secondary[e]		2,000	3,000	3,000	3,000	3,000
Iron and steel:						
Iron ore and concentrate, nickeliferous, Fe content[e]		600,000	600,000	575,000	575,000	575,000
Metal:						
Steel, crude		1,835,000	1,701,000	1,967,000	2,266,000	2,416,000 3
Ferroalloys, ferronickel, gross weight		97,761	95,376	95,230 r	102,162 r	100,000
Lead:						
Mine output, Pb content[e]		29,300	2,000 r	--	3,000 r	12,400
Metal, secondary	thousand metric tons	5	4	4 e	4 e	4
Manganese:[e]						
Ore, crude:						
Gross weight		100	100	100	100	100
Mn content		16	15	15	15	15
Concentrate:						
Gross weight		20	20	20	20	20
Mn content		15	15	15	15	15
Nickel:						
Ore:						
Gross weight[e]	thousand metric tons	2,800	2,700	2,700	2,800	2,700
Ni content of nickeliferous iron ore		22,670	21,410	21,700	23,210 r	21,670
Metal, Ni content of ferronickel		19,230	18,000 e	18,115	19,235 r	17,700
Silver, mine output, Ag content	kilograms	74,800	79,200	-- r	2,300 r	25,900 3
Zinc, mine output, Zn content by analysis		33,000	30,400	-- e	1,300 r	16,414 3
INDUSTRIAL MINERALS						
Abrasives, natural emery		8,000	8,000	8,000 e	8,000 e	8,000
Barite, concentrate[e]		100	100	50 r	30 r	--
Cement, hydraulic	thousand metric tons	14,282 r	14,638 r	15,039 r	15,166 r	15,000
Clays:						
Bentonite:						
Crude		1,056,598	1,156,642	1,030,556 r	1,124,795 r	1,125,000 3
Processed		15,806	10,835	8,606 r	2,450 r	2,500
Kaolin:						
Crude		57,885	59,680	53,438 r	49,912 r	50,000
Processed[e]		300	300	300	300 r	300
Feldspar		124,100	102,800	88,274 r	100,586 r	100,000
Gypsum and anhydrite		850,786	731,785	856,606 r	865,216 r	865,000
Magnesite:						
Crude		558,057	549,049	499,474 r	475,670 r	500,000
Dead-burned		48,220	43,713	50,813 r	58,089 r	58,000
Caustic-calcined		105,234	98,357	89,095 r	68,065 r	70,000
Huntite, crude[e]		18,000	18,000	18,000	18,000	18,000
Nitrogen, N content of ammonia		66,100	123,300	131,500	130,000	130,000
Perlite:						
Crude		838,997	1,079,036	1,053,388 r	1,075,129 r	1,100,000
Screened		515,715	739,729	525,000 e	550,000	550,000
Pozzolan, Santorin earth		1,291,198	1,383,546	1,255,590 r	1,458,850 r	1,500,000
Pumice		810,000	893,000	835,000 r	852,000 r	850,000
Salt, all types		126,118	192,161	187,522 r	198,024 r	195,000
Silica[e]		125,000	130,000	125,000 r	125,000 r	125,000

See footnotes at end of table.

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TABLE 1—Continued
GREECE: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2002	2003	2004	2005	2006[e]
INDUSTRIAL MINERALS—Continued						
Sodium compounds:[e]						
Carbonate		750	750	750	750	750
Sulfate		5,000	5,000	5,000	5,000	5,000
Stone:[e]						
Dolomite		90,000	90,000	40,000 [r]	60,000 [r]	60,000
Marble	cubic meters	178,839 [3]	233,436 [3]	144,860 [r, 3]	151,180 [r, 3]	150,000
Flysch		80,000	75,000	158,887 [r, 3]	93,509 [r, 3]	95,000
Quartz, microcrystalline	thousand metric tons	150 [r]	150 [r]	150 [r]	150 [r]	150
Sulfur:[e]						
S content of pyrites		9,500	9,500	9,500	9,500	9,500
Byproduct, natural gas and petroleum		157,000	162,000	160,000	160,000	160,000
Talc and steatite		670	500	200 [r]	250 [r]	250
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Lignite	thousand metric tons	71,074	69,411	71,237 [r]	73,585 [r]	74,000
Lignite briquets[e]		35,000	32,000	35,000 [r]	36,000 [r]	36,000
Gas:[e]						
Manufactured, gasworks	million cubic meters	15	15	15	15	15
Natural	do.	36	36	23 [r]	16 [r]	16
Natural gas plant liquids	thousand 42-gallon barrels	350	350	140	140 [e]	140
Petroleum:						
Crude	do.	1,417	1,026	997 [r]	756 [r]	760
Refinery products:						
Liquefied petroleum gas	do.	8,909	8,932	8,900 [e]	8,900	8,900
Gasoline	do.	32,300	32,725	33,150 [r]	32,725 [r]	32,000
Naphtha	do.	8,075	7,905	8,245 [r]	8,330 [r]	8,400
Mineral jelly and wax[e]	do.	20	20	20	20	20
Jet fuel	do.	14,725	14,400	15,600 [r]	16,000 [r]	16,000
Kerosene	do.	101	116	116 [r, e]	132 [r]	130
Distillate fuel oil	do.	41,031	41,776	42,522 [r]	43,268 [r]	42,000
Refinery gas	do.	3,640	3,710	4,200 [r]	4,900 [r]	4,800
Lubricants	do.	1,225	1,260	1,225 [r]	1,260 [r]	1,200
Residual fuel oil	do.	49,280	49,617	49,950 [r]	50,616 [r]	50,000
Bitumen	do.	3,091	3,151	3,100 [r]	3,121 [r]	3,000
Petroleum coke	do.	908	880	935 [r]	990 [r]	1,000
Other	do.	770	756	770 [r]	980 [r]	900
Refinery fuel and losses	do.	7,455	7,490	7,490 [r]	7,500	7,500
Total	do.	171,530	172,738	176,223 [r]	178,742 [r]	176,000

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. -- Zero.

[1]Table includes data available through October 2007.

[2]In addition to the commodities listed, other crude construction materials are produced, but no basis exists for estimation of production.

[3]Reported figure.

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TABLE 2
GREECE: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Alumina, Al_2O_3		Aluminium de Grèce S.A.(AdG) (Mytilineos Holdings S.A., 53%)	Agios Nikolaos, Boeotia area	750
Aluminum		do.	do.	160
Asbestos		Hellenic Mineral Mining Co. S.A.	Mines at Zidani, near Kozani	100
Barite, $BaSO_4$		S&B Industrial Minerals, S.A. (Eliopoulos-Kyriakopoulos Group)	Milos Island	1
Bauxite		do.	Mines at Phocis, plants at Phocis and Itea	2,000
Do.		Eleusis Bauxites Mines, S.A.	Mines near Drama, Itea, and Phthiotis-Phocis	300
Do.		do.	Plants in Aghia Marina, Drama, and Itea	400
Do.		Delphi-Distomon S.A.; Hellenic Bauxites of Distomon S.A. (Aluminium de Grèce S.A.)	Beotia and Phokifda mines, Delphi-Distomon area	500
Bentonite:				
Crude		Mediterranean Bentonite Co. S.A.	Surface mines on Milos Island	20
Do.		Mykobar Mining Co. S.A. (Silver & Baryte Ores Mining Co. S.A.)	Mines at Adamas, Milos Island	300
Do.		do.	Plants at Adamas, Milos Island	200
Do.		S&B Industrial Minerals, S.A. (Eliopoulos-Kyriakopoulos Group)	Mines at Adamas, Milos Island	600
Processed		do.	Plant at Voudia Bay, Milos Island	400
Cement		Halkis Cement Co. S.A. (Lafarge Group)	Micro-Vathi plant, west-central Euboea Island	3,000
Do.		Halyps Cement S.A. (Ciments Français, France)	Paralia Aspropyrgos plant, Athens	800
Do.		Heracles General Cement Company S.A. (Lafarge Group)	Plants at Halkis Evia, Milaki Evia, and Volos	9,600
Do.		Titan Cement Co. S.A.	Elefsis plant, Athens area	400
Do.		do.	Kamari plant, Boeotia	2,600
Do.		do.	Patras plant, northern Peloponnesus	1,900
Do.		do.	Salonica plant, Salonica	1,650
Ferroalloys, ferronickel, Ni content		Larco G.M.M. S.A.	Larymna metallurgical plant	25
Gold, Au in concentrate	kilograms	Hellas Gold S.A. (European Goldfields Ltd.)	Kassandra Mines (Olympias and Stratoni)	5,000
Gypsum		Lava Mining and Quarrying Co. S.A.	Altsi, Crete Island	500
Do.		Titan Cement Co. S.A.	do.	280
Hunite/hydromagnesite		Microfine S.A.	Mines in Kozani Basin	100
Lead, mine, Pb in concentrate		Hellas Gold S.A. (European Goldfields Ltd.)	Kassandra Mines (Olympias and Stratoni), northeastern Chalkidike	30
Lignite		Public Power Corporation (Government)	Aliveri Mine, Euboea Island	420
Do.		do.	Megalopolis Mine, central Peloponnesus	7,000
Do.		do.	Ptolemais Mine, near Kozani	28,000
Magnesite, concentrate		Grecian Magnesite S.A. (GM)	Mine and plant at Gerakini and Kalives, Chalkidiki, northern Greece	200
Manganese, battery-grade MnO_2		Eleusis Bauxite Mines Mining, Industrial and Shipping S.A. [National Bank of Greece (OAE)]	Nevrokopi, Drama	10
Marble, slab	cubic meters	Aghia Marina Marble Ltd.	Pallini	100,000
Do.	do.	Chris G. Karantanis & Sons Co.	Korinthos	60,000
Natural gas	million cubic meters per day	Public Petroleum Corporation (Government)	Prinos offshore gasfield and oilfield, east of Thasos Island	125
Nickel, ore		Larco G.M.M. S.A.	Agios Ioannis Mine, near Larymna	500
Do.		do.	Evia Mine, near Larymna	1,500
Nitrogen, N content of ammonia		Phosphoric Fertilizers S.A.	Nea Karvall	150

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TABLE 2—Continued
GREECE: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Perlite		S&B Industrial Minerals, S.A. (Eliopoulos-Kyriakopoulos Group)	Mines on Kos and Milos Islands; plant at Pireaus	650
Do.		Otavi Minen Hellas S.A. (Otavi Minen AG, Germany)	Milos Island	150
Do.		Bouras Co.	Kos Island	50
Petroleum, refined	42-gallon barrels per day	Hellenic Aspropyrgos Refinery S.A.	Aspropyrgos	95,000
Do.	do.	Motor Oil (Hellas) Corinth Refineries S.A.	Aghii Theodori, Corinth	140,000
Do.	do.	Petrola Hellas S.A.	Eleusis	100,000
Do.	do.	Thessaloniki Refining Co. A.E.	Thessaloniki	76,000
Pozzolan (Santorin earth)		Lava Mining and Quarrying Co. (Heracles Group)	Xylokeratia, Milos Island	600
Do.		Titan Cement Co. S.A.	do.	300
Pumice		Lava Mining and Quarrying Co. (Heracles Group)	Yali Island	100
Quartz (microcrystalline)		do.	Adamas, Milos Island	150
Steel, crude		Halyvourgia Thessalias S.A. (Manessis Bros. and Voyatzis S.A., 65%, and National Investment Bank for Industrial Development, 35%)	Steelworks at Volos	1,500
Do.		Sidenor Steel Products Manufacturing S.A.	Steelworks at Thessaloniki and Almyros	2,800
Do.		Halyvourgiki, Inc.	Steelworks at Eleusis	1,200
Do.		Hellenic Steel Co.	Steelworks at Thessaloniki	1,000
Do.		Corinth Pipeworks S.A. (CPW)	Steelworks at Thisvi	700
Zeolite		S&B Industrial Minerals, S.A. (Eliopoulos-Kyriakopoulos Group)	Mine at Pendalofos; plant at Ritsona	100
Zinc, mine, Zn in concentrate		Hellas Gold S.A. (European Goldfields Ltd.)	Kassandra Mines (Olympias and Stratoni), northeastern Chalkidike	30

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The Mineral Industry of Iceland

By Harold R. Newman

Iceland's economy was heavily dependent on its export sector. In 2006, the country exported aluminum, equipment and electronic machinery for fishing and fish processing, ferrosilicon alloys, and marine products. Abundant geothermal and hydroelectric power sources allow more than 90% of the population to use electricity and heating from these natural resources. In recent years, the country has actively sought to expand its power-intensive industries, which include aluminum smelting and ferrosilicon production. Aluminum and ferrosilicon were the country's leading export commodities. The aluminum and ferrosilicon plants relied on imported raw materials and inexpensive geothermal and hydroelectric energy (U.S. Department of State, 2006).

Production

Iceland has few proven mineral resources, although deposits of diatomite were being exploited. All production of industrial minerals, with the exception of diatomite, was used by local industries (table 1).

Structure of the Mineral Industry

The majority of shares in the major mineral enterprises, except for aluminum, were held by the Government. The remaining enterprises were either foreign-owned and locally operated, or in the case of small businesses, locally owned and operated (table 2).

Commodity Review

Metals

Aluminum.—Alcan Inc. announced that it had secured 40% of the energy required for a proposed 280,000-metric-ton-per-year (t/yr) expansion of its smelter in Straumsvik. In an agreement signed with Reykjavik Energy, Alcan would purchase 200 megawatts (MW) of geothermal power beginning in 2010 for a period of 25 years. Alcan was negotiating with Iceland's national power company, Landsvirkjun, for the remaining 60% of the required energy (Alcan Inc., 2006).

Alcoa Inc. was constructing an aluminum smelter in east Iceland. The Fjaroaal smelter, which would have a capacity of 346,000 t/yr, was scheduled to be completed in 2009 at an estimated cost of more than $1.1 billion. Alcoa was working with the Government of Iceland, the Landsvirkjun power company, and the municipality of Fjardabyggd to build the Karahjukar hydroelectric plant and the Fljotsdalur transmission lines to bring power to Fjaroaal. Alcoa decided to import alumina mostly from its operations in Guinea and Western Australia for smelting in Iceland rather than process it in areas where bauxite is mined because electric power is less expensive in Iceland than in most of the countries where bauxite is mined and refined (Alcoa Inc., 2006).

Century Aluminum Co. announced that its wholly owned subsidiary, Nordural ehf, would accelerate the expansion of its Grundartangi primary aluminum plant from 220,000 t/yr to 260,000 t/yr. Landsvirkjun agreed to deliver short-term excess power to facilitate early startup of the expansion. Construction was expected to be completed by yearend 2007 (Comtex News Network Inc., 2006).

Mineral Fuels and Other Sources of Energy

Iceland's planned hydroelectric power generation projects included the Burfell, with a 270-MW operating capacity; the Hrauneyjarfoss, 210-MW operating capacity; the Sigalda, 150-MW operating capacity; and the Blanda, 150-MW operating capacity. Iceland was exploring the possibility of exporting hydroelectric energy via submarine cable to mainland Europe (U.S. Department of State, 2006).

References Cited

Alcan Inc., 2006, Alcan secures 200MW power block for potential Iceland smelter expansion: Alcan Inc., May 8. (Accessed June 5, 2007, at http://www.alcan.com/web/publishing.nsf/Content/Alcan+Secures+200MW+Power+Block.)

Alcoa Inc., 2006, Aluminum for development: Alcoa Inc. (Accessed January 24, 2007, at http://www.alcoa.com/iceland/en/home.asp.)

Comtex News Network Inc., 2006, Century Aluminum Co. to accelerate additional Iceland expansion: Century Aluminum Co. (Accessed April 8, 2006, at http://www.pinksheets.com/quote/news.jsp?url=fis_story.asp%3Ftextpath%3DCOMTEX%5Ciw%5C2006%5CO3%5C77279114.html.)

U.S. Department of State, 2006, Iceland: U.S. Department of State background note, May. (Accessed October 12, 2007, at http://www.state.gov/r/pa/ei/bgn/3396.htm.)

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TABLE 1
ICELAND: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006[e]
Aluminum, metal, primary[2]		285,394	286,022	284,700	273,318	328,424 [3]
Cement, hydraulic[4]		82,636	89,798	100,287	132,438	141,433 [3]
Diatomite		26,494	27,513	19,332	3,236	--
Ferrosilicon		120,624	117,171	119,389	114,844	113,798 [3]
Pumice and related volcanic material:						
Pumice		56,478	50,193	36,045	105,454	92,663 [3]
Scoria[e]		1,000	1,000	1,000	1,000	1,000
Salt[e]		4,500	4,500	4,600	4,600	4,500
Sand:[e]						
Basaltic	cubic meters	1,200	1,200	1,300	1,300	1,200
Calcareous, shell	do.	80,000	80,000	80,000	80,000	75,000
Sand and gravel	thousand cubic meters	4,200	4,200	4,200	4,300	4,200
Silica dust[5]		22,579 [3]	23,830 [3]	22,533 [3]	22,992 [3]	24,955 [3]
Stone, crushed:[e]						
Basaltic		95,000	96,000	96,000	97,000	95,000
Rhyolite	cubic meters	18,000	18,000	19,000	19,000	18,000

[e]Estimated; estimated data are rounded to no more than three significant digits. -- Zero.
[1]Table includes data available through September 28, 2007.
[2]Ingot and rolling billet production.
[3]Reported figure.
[4]Sales.
[5]Byproduct of ferrosilicon.

TABLE 2
ICELAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum	Icelandic Aluminium [ISAL] (Alusuisse-Lonza Holding Ltd., 100%)	Straumsvik	162
Do.	Nordic Aluminium Ltd. (Nordural) (Columbia Ventures Corp., 100%)	Grundartangi	60
Cement	Sementsverksmidja Rikisins (Government, 100%)	Akranes	115
Diatomite	Kisilidjan hf [Diatomite Plant Ltd.] (Government, 98%)	Myvatnssveit	27
Ferrosilicon	Islenska jarnblendifelagid hf [Icelandic Alloys Ltd.] (Government, 55%, and Elkem A/S, 30%)	Plant at Grundartangi	72
Fertilizer	Aburdarverksmidja Rikisins (Government, 100%)	Gufunes	60
Pumice	Eldber hf (Jardenfnaidnadur hf, 51%)	Mount Hekla	210
Do.	Pumice Products Ltd. (BM Valla Ltd., 100%)	do.	32
Salt	Icelandic Salt Co. (Akzo NV of Netherlands, 58%)	Plant at Svartsengi	5

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The Mineral Industry of Ireland

By Harold R. Newman

Ireland's geology includes several lithological units and tectonic features that are favorable for the occurrence of several types of mineral resources, from base metals to industrial minerals. The main focus for exploration and development of Ireland's lead-zinc deposits was the Carboniferous rock of the Midlands region. Stratabound mineralization is hosted in carbonate units.

Minerals in the National Economy

Ireland remained a major European Union (EU) producer of lead and zinc ore and an important producer of alumina and peat in 2006. Ireland was also one of the leading exporters of lead and zinc concentrate. Ireland is a trade-dependent country and exports remain a key component of its gross domestic product (GDP). Minerals account for less than 1% of exports. Mining accounts for about 1% of the GDP and about 1% of the work force.

Production

Zinc production was centered on Anglo American plc's Lisheen lead-zinc mine, Arcon International Resources plc's Galmoy lead-zinc mine, and New Boliden AB's Tara lead-zinc mine. These were three of Europe's most modern mines (table 1).

Structure of the Mineral Industry

The country's mines and mineral-processing industry were important to the economy of the country. Companies were mostly privately owned. The major mineral industry facilities and their capacities are listed in table 2.

Commodity Review

Metals

Bauxite and Alumina.—Aughinish Alumina Ltd.'s (a subsidiary of the Switzerland-based Glencore International AG) alumina refinery was situated on Aughinish Island on the south side of the Shannon estuary near Limerick City. Aughinish Alumina produced about 1 million metric tons per year of alumina in 2006 by treating bauxite ore using the Bayer process. Most of the bauxite was imported from Guinea, although some was imported from Australia and Brazil (Aughinish Alumina Ltd., 2006).

Lead and Zinc.—Ireland was the leading producer of zinc ore in Europe and had three major producing mines within the Rathdowney Trend in the Midland Orefield. These operations included the world-class ore bodies at Galmoy, Lisheen, and Navan. Arcon International Resources plc had success extending existing reserves in the K and CW zones at the Galmoy Mine. Semimassive to massive sulfide mineralization was intersected over 3.6 meters grading 9.79% zinc, 1.99% lead, and 4.52 grams per metric ton silver. The exploration budget at Anglo American plc's Lisheen Mine was $2 million. The Government granted AngloAmerican permission to exploit the Bog Zone ore body; the development and opening of this ore body was to continue into 2007. At New Boliden AB's Tara Mine, which is located near Navan, exploration within the mine was continuing in the SWEX, SWEX B, and Nevinstown zones. Mineralization was found in several holes, and followup work was continuing (Mining Magazine, 2006).

Mineral Fuels

Natural Gas and Petroleum.—Historically, Ireland has not been a very successful location for natural gas and petroleum exploration. Activity has been limited because of the lack of success of earlier exploration programs and by the high cost of exploration. Natural gas represents about 23% of the country's primary energy consumption. Indigenous reserves of natural gas are located in the Kinsale Head field and the smaller Ballycotton field off the coast of Cork.

The Government invited more exploration firms to drill for gas in the Porcupine Basin off Ireland's southwest coast. Only five exploration wells had been drilled in the Porcupine area in the past 20 years, and although the area may have potential, it remained underexplored. Drilling licenses for an area covering 63,500 square kilometers of the seabed were proposed. The Government indicated that the country was relying too heavily on imported gas and needed to develop its own resources (Alexander's Gas & Oil Connections, 2006).

Outlook

The Geological Survey of Ireland will continue to be responsible for the development of minerals information and the technical management of the state mineral licensing and leasing system. Ireland will remain a major EU producer of zinc ore and an important producer of alumina and lead ore and metal. Exploration activity for additional new mineral resources, with the main emphasis on gold, lead, and zinc, will continue.

More-extensive coverage of the mineral industry of Ireland can be found in the U.S. Geological Survey Minerals Yearbook 2005, volume III, Area Reports—International—Europe and Central Eurasia.

References Cited

Alexander's Gas & Oil Connections, 2006, Ireland urges exploration firms to drill for gas: Alexander's Gas & Oil Connections, January 4. (Accessed February 17, 2008, at http://www.gasandoil.com/goc/news/nte70518.htm.)

Aughinish Alumina Ltd., 2006, Homepage: Aughinish Alumina Ltd. (Accessed February 21, 2008, at http://www.aughinish.com/company_info/Companyinfosheet2004.pdf.n.htm.)

Mining Magazine, 2006, Emerald renaissance: Mining Magazine, August, v. 195, no. 2, p. 14.

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TABLE 1
IRELAND: PRODUCTION OF MINERAL COMMODITIES[1]

(Thousand metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006[e]
METALS						
Alumina[e]		1,200	1,200	1,400	1,500	1,000
Lead:						
Mine output, Pb content	metric tons	32,486	50,339	65,915	63,810	61,800 [2]
Metal, refined, secondary[e]	do.	6,600	6,600	19,600	19,992 [2]	21,700 [2]
Silver, mine output, Ag content	kilograms	5,000	6,500	6,300	6,000	12,900 [2]
Zinc, mine output, Zn content	metric tons	252,700	419,041	444,127	428,596	425,800 [2]
INDUSTRIAL MINERALS[3]						
Cement, hydraulic[e]		3,320	3,830	4,000	4,000	4,700
Gypsum[e]		500	500	500	500	700
Lime[e]		300	300	300	300	300
Nitrogen, N content of ammonia		300	--	--	--	--
Sand and gravel[e, 4]		12,000	12,000	12,000	12,000	64,000 [2]
Stone and other quarry products:[e]						
Limestone	million metric tons	1	1	1	1	1
Other[5]	metric tons	36,000	36,000	36,000	36,000	3,600
MINERAL FUELS AND RELATED MATERIALS						
Gas, natural, marketed[e]	million cubic meters	2,500	2,500	2,500	570 [r, 2]	535 [2]
Peat:[6]						
For horticultural use		350	451	450 [r, e]	475 [r, 2]	500
For fuel use, milled peat[7]		4,138	2,739	5,200 [e]	4,100 [r, 2]	3,800 [2]
Total		4,488	3,190	5,650 [r, e]	4,575 [r, 2]	4,300
Briquets		268	269	284	275	260
Petroleum refinery products:[8]						
Liquefied petroleum gas	thousand 42-gallon barrels	694	657	500 [e]	500 [e]	500
Naphtha[e]	do.	900	900	900	900	900
Gasoline, motor	do.	5,585	5,402	4,500 [e]	4,500 [e]	4,500
Distillate fuel oil	do.	7,191	7,373	8,000 [e]	8,000 [e]	8,000
Residual fuel oil	do.	6,899	6,497	7,000 [e]	7,000 [e]	7,000
Refinery fuel and losses	do.	912	913	75 [e]	75 [e]	75
Total	do.	22,181	21,742	21,000 [e]	21,000 [e]	21,000

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. -- Zero.

[1]Table includes data available through September 2007.

[2]Reported figure.

[3]Ireland also produces significant quantities of synthetic diamond and is the major supplier to the United States. Output, however, is not quantitatively reported, and general information is inadequate to make reliable estimates of output.

[4]Excludes output by local authorities and road contractors.

[5]Includes clays for cement production, fire clay, granite, marble, rock sand, silica rock, and slate.

[6]Includes production by farmers and by the Bord Na Mona (Government Peat Board).

[7]Includes milled peat used for briquet production.

[8]From imported crude oil.

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TABLE 2
IRELAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facility	Annual capacity
Alumina		Aughinish Alumina plc (Glencore International AG)	Aughinish Island, County Limerick	1,500
Cement		Irish Cement Ltd.	Plants in Limerick and Platin	2,000
Lead-zinc, concentrate		Anglo American plc	Lisheen Mine, County Kilkenny	160
Do.		Arcon International Resources plc (Lundin Mining Corp., 84%)	Galmoy Mine, County Kilkenny	135
Do.		New Boliden AB	Tara Mine, Navan, County Meath	215
Natural gas	million cubic feet	Marathon Oil Corp.	Kinsale Head Field, Celtic Sea	75,000
Do.	do.	Ramco Energy plc.	Seven Hills field	50,000
Nitrogen, N content of ammonia		Irish Fertilizer Industries	Plant at Marino Point	450
Peat		Bord Na Mona (Government Peat Board)	Production mainly in the Midlands	4,200
Petroleum, refined	42-gallon barrels per day	Irish National Petroleum Corp. Ltd. (Tosco Corp., 100%)	Whitegate, near Cork	75,000
Steel		Irish Ispat (Ispat International NV)	Haulbowline, near Cork (closed)	500

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The Mineral Industry of Italy

By Walter G. Steblez[1]

In 2006, Italy's gross domestic product (GDP) grew by 1.9% compared with that of 2005 and amounted to an estimated $1.8 trillion; it was the fourth largest economy in the European Union (EU), after Germany, the United Kingdom, and France. The country's economy was complex and highly developed with industry accounting for about 29% of the GDP. Heavy industry comprised facilities for the production of chemicals and iron and steel, for machine building and metal working, and for automotive assembly. These sectors were heavily dependent on imported nonfuel and fuel mineral inputs (U.S. Central Intelligence Agency, 2006). The acquisition of the Lucchini Steel Group by OAO Severstal of Russia was one of the highlights in the country's mineral industry in 2006.

Minerals in the National Economy

Italy's mineral industries produced such metals as copper, iron and steel, lead, and zinc, all important material for the country's manufacturing sector. The raw materials used to produce these and other metals stemmed from imported ores and concentrates and from secondary scrap recovery. The country was also highly import-dependent on mineral fuels; it remained, however, an important world producer of a variety of industrial minerals, which included cement, clays, feldspar, lime, marble, pumice, and sand and gravel.

Government Policies and Programs

The Government continued to play a role in the economy through regulation of ownership of large industrial and financial companies; privatization and regulatory reform in accordance with EU directives, however, had reduced that presence. Italy's basic mining legislation was mining law No. 1443 of July 29, 1927, which gave subsoil ownership of minerals to the state. The reimbursement of the state by mining concessionaires was regulated by law No. 752 of June 10, 1982. Quarrying operations were regulated by law No. 44 of September 1982.

As a member of the EU, Italy's national environmental policy generally is in full accord with established EU environmental laws and regulations. Such disparities between the two sides as definition of terminology (waste) persisted, however, and had bearing on Italy's ferrous and nonferrous metals scrap sector (Ferrigno, 2003). Environmental issues in Italy were focused on three main problem areas—air pollution from industrial emissions, such as sulfur dioxide; water pollution of coastal and inland rivers from industrial and agricultural effluents; and such natural hazards as landslides, avalanches, volcanic eruptions, and land subsidence in Venice (U.S. Central Intelligence Agency, 2006).

In the industrial minerals sector, a new legislative decree that superseded law No. 748/1984 stipulated the replacement of all domestic Italian mineral fertilizer grades with those within the parameters of EU standards. Compulsory registration of fertilizer producers and products was specified in the legislation (Fertilizer Week, 2006).

Production

In 2006, the iron and steel sector reported production increases for pig iron and crude steel of about 1% and 9%, respectively, compared with output levels in 2005. During the same period, the nonferrous sector showed mixed results. Aluminum and copper production increased by about 2% and 13%, respectively, compared with that of 2005; the output of lead and zinc metal, however, declined by about 10% each. In the industrial minerals sector, cement output rose by about 7.3% compared with that of 2005. Among mineral fuels, natural gas and petroleum production declined by about 8% and 5%, respectively (table 1).

Structure of the Mineral Industry

Private and mixed public and private entities were the principal owners of Italy's mineral industries. Full Government (public) ownership continued mainly in the mineral fuels sector (table 2).

Mineral Trade

In 2005 (the latest year for which foreign trade data were available), Italy's trade was mainly with other member-countries of the EU. Exports to the EU amounted to more than €173 billion[1] ($228 billion) and accounted for about 59% of total exports. Imports from the EU amounted to about €175 billion ($231 billion) and accounted for about 57% of total imports. As a percentage of total exports, the value of fuel and nonfuel minerals constituted about 0.3%. Fuel and nonfuel minerals, however, accounted for more than 14% of the value of total imports. Among imports of mineral fuels and related material, natural gas and oil imports amounted to more than €39 billion ($51 billion), which was an import increase of about 40% compared with that of 2004 and constituted about 96% of total imports in this category. Imports of metal ores and concentrates amounted to about €1.4 billion ($1.8 billion), which was an increase of about 38% compared to those of 2004. Imports of industrial minerals amounted to about €1.2 billion ($1.6 billion), which was an increase of about 3.4% compared with those of 2004 (Instituto Nazionale di Statistica, 2006).

[1]Deceased.

[1]Values have been converted from the European Union euros (€) to U.S. dollars ($) at a rate of €0.76=US$1.00 for 2006.

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Commodity Review

Metals

Aluminum and Bauxite and Alumina.—In 2006, Italy's output of primary and secondary aluminum increased by about 0.7% and 1.7%, respectively (table 1). The country's chief producers of alumina and primary aluminum were Alcoa Italia S.p.A. and Eurallumina S.p.A. In August, Eurallumina was acquired by United Company RUSAL, which was a major Russian producer of aluminum. RUSAL purchased 56.2% of Eurallumina's stock from Rio Tinto plc of the United Kingdom. Euralumina's alumina refinery in the Porto Vesme Industrial Area in southwestern Sardinia produced metallurgical-grade alumina and aluminum hydrate for domestic consumption by Alcoa's primary aluminum smelter in the same area and for export (Rio Tinto plc, 2006; United Company RUSAL, 2006a, b).

Copper.—KME Group S.p.A. (a major European refiner and fabricator of copper headquartered in Florence) conducted its operations within Italy under its subsidiary Europa Matalli S.p.A. at Barga and at Scrivia. Copper and copper semimanufactures were the main products at these locations. Italy imported small amounts of copper concentrate and relied mainly on scrap recovery and imports. In 2006, refined primary and secondary copper production increased by about 13%.

Gold.—Midyear 2006, Sargold Resource Corp. of Canada finalized the acquisition of Sardinia Gold Mines S.p.A. (SGM) from Medoro Resources Ltd. Sargold received 90% of SGM's shares for about €1 million ($1.32 million). Sargold also acquired a 75% interest in SGM Ricerche S.p.A. (also for about $1.32 million), which held major interests in the Monte Ollastedu gold exploration project (Sargold Resource Corp., 2006c). By yearend, Sargold held the largest share of gold exploration and development assets in Sardinia; they included the Furtei, the Monte Ollastedu, and the Osilo properties (Sargold Resource Corp., 2006b).

The Furtei deposit was worked until 2003 by the Furtei Gold Mine; the company beneficiated about 400,000 metric tons per year (t/yr) of ore. Sargold indicated that the mine and beneficiation plant were well maintained; plans to restart operations were under review during the year. The deposit holds strata-bound mineralization of Tertiary age and was estimated to contain a resource of 584,000 troy ounces of gold. Additional gold deposits had been delineated by SGM in the Furtei region, which Sargold reportedly planned to explore further. Sargold also planned to conduct exploration for gold at the Monte Ollastedu and the Osilo properties (Sargold Resource Corp., 2006a).

In late 2006, Adroit Resources Inc. of Vancouver, British Columbia, Canada, conducted exploration for gold in the southern Tuscany area. Adroit explored 10 properties, which covered an area of about 6,400 hectares (15,815 acres), to validate the presence of Carlin-type epithermal gold (Adroit Resources Inc., 2006).

Iron and Steel.—Italy remained a major European producer and consumer of pig iron and crude and finished steels. In 2006, the output of pig iron and crude steel increased by about 1% and 9%, respectively, compared with that of 2005 (table 1). In 2005 (the latest year for which comparable iron and steel data were available), Italy produced more than 11.4 million metric tons (Mt) of pig iron and more than 29 Mt of crude steel, which placed the country as the third ranked pig iron producer in Europe [excluding the Commonwealth of Independent States (CIS)] after Germany and France, and the second ranked producer of crude steel after Germany. Italy's apparent consumption of crude steel ranked the country second in Europe (excluding the CIS) after Germany. Italy's apparent consumption of finished steel amounted to more than 31 Mt, which was the second largest consumption level in Europe and Central Eurasia, after Germany (International Iron and Steel Institute, 2006, p. 3, 10, 77, 80, 83).

Important transactions during the year in Italy's iron and steel sector included the acquisition in October of controlling shares in Lucchini by Severstal, which followed Severstal's acquisition of Lucchini's stock throughout the preceding year (Helmer, 2007; OAO Severstal, 2007). In 2005, Russia's other major steel producer, Evraz Holding, acquired controlling interest (75% equity) in Italy's Palini e Bertoli S.p.A. iron and steel works, which was a 500,000-t/yr steel rolling operation that would process Evraz's steel slabs (Kommersant, 2005).

As part of a divestiture agreement of specified EU-based steel assets, Arcelor Mittal agreed to the sale of Travi e Profilati di Pallanzo (rolling mill) and San Zeno Acciai (electric arc furnace steel plant) in northern Italy. The divestiture agreement was one of the conditions set by the EU for Mittal Steel N.V.'s acquisition of Arcelor S.A. earlier in the year (Arcelor Mittal, 2006).

Lead and Zinc.—In 2006, Italy's output of refined lead (primary and secondary) and zinc (primary) declined by 9.7% and 9.9%, respectively. Because domestic mine production of lead and zinc (located in Sardinia) was minor, Italy depended on imports of lead and zinc ores and concentrates. Italy imported most of its requirements for lead and zinc concentrates; a minor amount of lead and zinc concentrate, however, was produced in Sardinia. Glencore International AG of Switzerland remained the country's principal processor (smelter and refiner) of lead and zinc (table 2).

Industrial Minerals

In 2006, Italy remained a leading European and global producer of such industrial minerals as bromine (among the top 13 world producers), pumice (27% of world output), feldspar (19% of world output), bentonite (4% of world output), cement (2% of world output), lime (2% of world output), and gypsum (1% of world output) (Founie, 2007a, b; Lyday, 2007; Miller, 2007; Potter, 2007; van Oss, 2007; Virta, 2007). Industrial minerals for which there were insufficient domestic resources and that had to be imported (main supplier indicated) included ball clay and barite (Ukraine), chamotte (Germany), fluorspar (China), kaolin (United States), magnesite (Turkey), mica (China), and talc (China) (Wilson, 2007).

In December, Pumex S.p.A., which was the world's leading producer of pumice and pumice products, reportedly ceased mining operations. Pumex operations were located in Lipari off

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the northwest coast of Sicily—an island that in 2000 became part of the Aeolian island group that was declared a World Heritage Site by the United Nations Educational, Scientific, and Cultural Organization (UNESCO). Company spokespersons indicated that operations were to continue through processing stocks, which were sufficient for about 12 months. Mining operations would resume when inconsistencies between environmental and commercial policies were resolved (Industrial Minerals, 2007).

Mineral Fuels and Other Sources of Energy

Coal.—Although no coal production was reported for 2006, Carbosulcis S.p.A., which was a Sardinian Government-owned coal-mining enterprise, reached an agreement in November with Enel S.p.A. that called for Carbosulcis to provide 1.1 Mt of coal to Enel within 3 years. Enel was Italy's leading power company; Carbosulcis was the country's only coal mining enterprise; it had coal reserves estimated to amount to 600 Mt (Carbosulcis S.p.A., 2006).

Natural Gas and Petroleum.—In 2006, Italy's output of natural gas and petroleum declined by about 8.2% and 5.0%, respectively, compared with that of 2005. The country was not well endowed with hydrocarbons and imported as much as 80% of its total domestic needs of gas and oil. Italy's natural gas reserves were estimated to be 16 billion cubic meters, and its petroleum reserves were estimated to be 100 Mt (table 1; BP p.l.c., 2007).

Major issues in the oil and gas sector included plans to put the Tempa Rossa oilfield in the southern Apennines into production by 2010; petroleum would be extracted from six wells, of which five had been drilled by 2006. At full capacity, output at Tempa Rossa was envisaged to amount to about 50,000 barrels per day of petroleum, which would be transported to the Toranto refinery by pipeline. Total S.A. of France held 50% of Tempe Rossa's shares; Exxon Mobil Corp. and Royal Dutch Shell plc each held 25% (Petroleum Economist, 2006b). In midyear, Eni S.p.A. of Italy obtained Government approval to develop the Guendalina and the Tea gasfields in the northern Adriatic area. Eni and Mediterranean Oil & Gas Plc of the United Kingdom owned 80% and 20% interest in the project, respectively (Petroleum Economist, 2006a). In April, Italy and Tunisia signed an agreement to expand the capacity of the pipeline that carried natural gas from Algeria to Italy through Tunisia. The project, which was valued at about $400 million, would raise the pipeline carrying capacity to 33.9 billion cubic meters per year from 27.4 billion cubic meters per year (Alexander's Gas & Oil Connections, 2006).

Nuclear Energy.—In September, Metex Resources Ltd. of Australia announced plans to explore for uranium in Lombardy. Deposits that were estimated to hold inferred resources of 870,000 metric tons of ore (0.15% U_3O_8) were discovered in the 1960s. The company submitted an application for an exploration license to the Lombardy government, which, in response to pressure from local groups, placed a moratorium on processing the application. The area covered by Metex's exploration license application was about 291 hectares (719 acres) near Valgolio (Metex Resources Ltd., 2006).

Outlook

Italy is expected to continue to be a major producer of consumer and producer durables and to continue to rely on imported and recycled mineral raw materials. The country is likely to continue to rely on major imports of mineral fuels, despite some anticipated increases in domestic production from new deposits coming onstream in the near term.

References Cited

Adroit Resources Inc., 2006, Adroit updated Tuscany gold projects: Vancouver, British Columbia, Canada, Adroit Resources press release, October 3, 2 p.

Alexander's Gas & Oil Connections, 2006, Tunisia and Italy sign gas pipeline deals: Alexander's Gas & Oil Connections, v. 11, no. 8, April 20, 1 p.

Arcelor Mittal, 2006, Arcelor Mittal announces sale of Italian long carbon steel products: Rotterdam, Netherlands, Arcelor Mittal press release, December 13, 2 p.

BP p.l.c., 2007, BP statistical review of world energy: London, United Kingdom, BP p.l.c., June, 48 p.

Carbosulcis S.p.A., 2006, Ripartenza delle attivita' produttive: Sardinia, Italy, Carbosulcis, S.p.A. press release, November, 1 p.

Ferrigno, Robert, 2003, A case study on the implementation of EU environmental legislation—Italy: Brussels, Belgium, European Environmental Bureau, March, 4 p.

Fertilizer Week, 2006, Italy revises fertilizer trade regulation: Fertilizer Week, v. 20, no. 7, May 26, p. 3.

Founie, Alan, 2007a, Gypsum: U.S. Geological Survey Mineral Commodity Summaries 2007, p. 74–75.

Founie, Alan, 2007b, Pumice: U.S. Geological Survey Mineral Commodity Summaries 2007, p. 126–127.

Helmer, John, 2007, Mayday, mayday—Steelmaker Severstal reveals $6 billion bank deposit: Johannesburg, South Africa, Mineweb Holdings Ltd., May 10, 3 p.

Industrial Minerals, 2007, Lipari pumice mine closes amidst protest: Industrial Minerals, no. 472, p. 13.

Instituto Nazionale di Statisctica, 2006, Annuario statistico Italiano 2006: Rome, Italy, Instituto Nazionale di Statisctica, 825 p.

International Iron and Steel Institute, 2006, Statistical yearbook 2006: Brussels, Belgium, International Iron and Steel Institute, December 14, 108 p.

Kommersant, 2005, Evrazholding buys Italian arrears to get access to rolled market: Kommersant, [Moscow, Russia], August 15, p. 1.

Lyday, P.A., 2007, Bromine: U.S. Geological Survey Mineral Commodity Summaries 2007, p. 36–37.

Metex Resources Ltd., 2006, March 2007 quarterly report: West Perth, Australia, Metex Resources Ltd., March, 18 p.

Miller, M.M., 2007, Lime: U.S. Geological Survey Mineral Commodity Summaries 2007, p. 94–95.

OAO Severstal, 2007, Consolidated condensed interim statement for the three months ended March 31, 2007: Moscow, Russia, OAO Severstal, March 31, 11 p.

Petroleum Economist, 2006a, Western Europe—Italy: Petroleum Economist, v. 73, no. 6, p. 47.

Petroleum Economist, 2006b, Western Europe—Italy: Petroleum Economist, v. 73, no. 11, p. 40.

Potter, M.J., 2007, Feldspar: U.S. Geological Survey Mineral Commodity Summaries 2007, p. 58–59.

Rio Tinto plc, 2006, Sale of Eurallumina interest: London, United Kingdom, Rio Tinto plc press release PR 494g, August 17, 1 p.

Sargold Resource Corp., 2006a, Furtei Gold Mines S.p.A.: Vancouver, British Columbia, Canada, Sargold Resource Corp. press release, December 28, 2 p.

Sargold Resource Corp., 2006b, Sargold and Medoro amend agreement: Vancouver, British Columbia, Canada, Sargold Resource Corp. press release, May 29, 2 p.

Sargold Resource Corp., 2006c, Sargold completes agreement with Medoro Resources: Vancouver, British Columbia, Canada, Sargold Resource Corp. press release, August, 22, 3 p.

United Company RUSAL, 2006a, RUSAL acquires 56.2% stake in Eurallumina refinery: Moscow, Russia, United Company RUSAL press release, November 3, 2 p.

Digitized by Google

United Company RUSAL, 2006b, Eurallumina: Moscow, Russia, United Company RUSAL press release, December 31, 2 p.
U.S. Central Intelligence Agency, 2006, Italy, *in* World factbook 2006: U.S. Central Intelligence Agency, January 1, 709 p.
van Oss, H.G., 2007, Cement: U.S. Geological Survey Mineral Commodity Summaries 2007, p. 40–41.
Virta, R.L., 2007, Clays: U.S. Geological Survey Mineral Commodity Summaries 2007, p. 46–47.
Wilson, Ian, 2007, Minerals of Italy—Built to last: Industrial Minerals, no. 479, August, p. 32–33.

TABLE 1
ITALY: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006[e]
METALS						
Aluminum:						
Alumina, calcined basis		1,010,000 [e]	1,021,000 [r]	1,064,000 [r]	1,109,457 [r]	1,100,000
Bauxite[e]		3,431 [r,2]	-- [r]	-- [r]	300	--
Metal:						
Primary		190,000 [r]	191,400 [r]	195,400	192,900	194,200 [2]
Secondary		591,300 [r]	594,000	619,000	654,100	665,500 [2]
Total		781,300 [r]	785,400 [r]	814,400	847,000	859,700 [2]
Antimony, oxides, gross weight[3]		-- [r]	-- [r]	-- [r]	-- [r]	--
Bismuth, metal[e]		5	5	5	5	5
Cadmium, metal, smelter		362 [r]	22	--	--	--
Copper, metal, refined, all kinds[e]		32,400	26,700 [2]	33,600	32,200	36,400 [2]
Gold, mine output, Au content	kilograms	631	100 [r,e]	-- [r]	-- [r]	--
Iron and steel, metal:						
Pig iron	thousand metric tons	9,736	10,604 [r]	10,664 [r]	11,423 [r]	11,535 [2]
Ferroalloys, electric furnace:[e]						
Ferromanganese		40,000	40,000	40,000	40,000	40,000
Ferrosilicon		12,000	12,000	12,000	12,000	10,000
Silicomanganese		80,000	100,000 [r]	100,000 [r]	100,000 [r]	100,000
Silicon metal		-- [r]	-- [r]	--	--	--
Other		10,000	10,000	10,000	10,000	10,000
Total		142,000 [r]	162,000 [r]	162,000 [r]	162,000 [r]	160,000
Steel, crude	thousand metric tons	25,930	26,832	28,317 [r]	29,061 [r]	31,550 [2]
Lead:						
Mine output, Pb content[e]		3,073 [r,2]	2,621 [r,2]	800 [r]	800 [r]	800
Metal, refined:						
Primary		41,000 [e]	16,000 [e]	40,000	49,500	34,600 [2]
Secondary		152,000 [e]	198,000 [e]	162,000	161,500	155,900 [2]
Total		193,000 [e]	214,000	202,000	211,000	190,500 [2]
Manganese, mine output, Mn content		867 [r]	763 [r]	714 [r]	600 [r,e]	600
Silver, mine output, Ag content[e]	kilograms	1,000 [r]	1,000 [r]	200 [r]	100 [r]	100
Zinc, metal, primary		175,800	123,100	118,000 [e]	121,200 [r]	109,200 [2]
INDUSTRIAL MINERALS						
Barite		10,215	12,214	9,698 [r]	4,722 [r]	5,000
Bromine[e]		300	300	300	300	300
Cement, hydraulic	thousand metric tons	41,722 [r]	43,580 [r]	45,343 [r]	40,284 [r]	43,234 [2]
Clays, crude:						
Common clay	do.	4,053	3,808	3,858	3,651	3,937 [2]
Bentonite	do.	463	474	475 [r]	446 [r]	470 [2]
Refractory excluding kaolinitic earth	do.	2,219 [r]	2,639	1,375 [r]	1,310 [r]	1,964 [2]
Ball clay	do.	1,129	691	568	539	550
Fuller's earth[e]	do.	25 [r,2]	3 [r,2]	3 [r]	3	3
Kaolin	do.	215 [r]	257 [r]	247 [r]	250	470 [2]
Kaolinitic earth	do.	-- [r]	-- [r]	-- [r]	-- [r]	--

See footnotes at end of table.

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TABLE 1—Continued
ITALY: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006[e]
INDUSTRIAL MINERALS—Continued						
Diatomite[e]		25,000	25,000	25,000	25,000	25,000
Feldspar	thousand metric tons	3,159 [r]	2,972 [r]	3,251 [r]	3,335 [r]	4,019 [2]
Fluorspar		53,260 [r]	26,387 [r]	17,915 [r]	15,000 [r]	15,000
Gypsum	thousand metric tons	2,638 [r]	1,784 [r]	1,616 [r]	2,356 [r]	2,860 [2]
Lime, hydrated, hydraulic, and quicklime	do.	5,500 [r]	5,510 [r]	5,982 [r]	5,894 [r]	5,800
Magnesia	do.	300	444	350	371	348 [2]
Nitrogen, N content of ammonia	do.	391	475	532	525	500
Perlite[e]		60,000	60,000	60,000	60,000	60,000
Pigments, mineral, iron oxides, natural[e]		500	500	500	500	500
Pumice and related materials:						
Pumice	thousand metric tons	25 [r]	25 [r]	27 [r]	28 [r]	30
Pozzolan[e]	do.	4,000	4,000	4,000	4,000	4,000
Salt	do.	3,947 [r]	2,128 [r]	3,174 [r]	3,613 [r]	3,438 [2]
Sand and gravel	do.	200,777 [r]	212,169 [r]	176,252 [r]	206,149 [r]	210,000
Silica sand	do.	13,853 [r]	12,656 [r]	12,791 [r]	13,492 [r]	14,000
Sodium compounds, n.e.s.:[e, 4]						
Soda ash	do.	100	100	100	100	100
Sodium sulfate	do.	125	125	125	125	125
Stone:						
Calcareous:						
Alabaster[e]	do.	5,000 [r]	5,000 [r]	7,215 [r, 2]	7,000 [r]	7,000
Chalk	do.	302 [r]	474 [r]	330 [r]	312 [r]	228 [2]
Dolomite	do.	1,942 [r]	2,046 [r]	2,213 [r]	2,092 [r]	2,192 [2]
Marble and travertine, crude	do.	4,819 [r]	4,396 [r]	5,155 [r]	5,061 [r]	4,687 [2]
Limestone for lime and cement	do.	46,045 [r]	28,633 [r]	40,000 [r]	42,390 [r]	41,255 [2]
Granite	do.	1,581 [r]	2,288 [r]	2,637 [r]	2,651 [r]	1,894 [2]
Sandstone	do.	372 [r]	353 [r]	369 [r]	362 [r]	397 [2]
Slate	do.	136 [r]	150 [r]	143 [r]	138 [r]	220 [2]
Crushed and broken[5]	do.	46,512 [r]	44,562 [r]	54,195 [r]	61,640 [r]	60,000
Sulfur:						
From metallurgy	do.	142	127	113	92	90
From hydrocarbons	do.	560	565	575	650	650
Talc and related materials		125,040 [r]	122,849 [r]	111,887 [r]	112,781 [r]	146,942 [2]
MINERAL FUELS AND RELATED MATERIALS						
Asphalt and bituminous rock, natural	thousand metric tons	2,000 [r]	955 [r]	1,807 [r]	1,900 [r]	1,807 [2]
Coal:						
Lignite	do.	10	10	--	--	--
Subbituminous, Sulcis coal		5	--	--	--	--
Coke, metallurgical[e]	thousand metric tons	4,064 [3]	4,500	4,500	4,000 [r]	4,000
Gas, natural	million cubic meters	14,623 [r]	13,885 [r]	12,961 [r]	11,977 [r]	11,000 [2]
Natural gas liquids[e]	thousand 42-gallon barrels	350	350	350	350	350
Petroleum:						
Crude:						
As reported		5,531,000	5,570,000	5,445,000	6,100,000	5,800,000 [2]
Converted	thousand 42-gallon barrels	28,208 [r]	28,407 [r]	27,670 [r]	31,110 [r]	29,600
Refinery products[e]	do.	737,000	650,000 [r]	650,000 [r]	650,000 [r]	650,000

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. -- Zero.

[1]Table includes data available through June 2007.

[2]Reported figure.

[3]Antimony content is 83% of gross weight.

[4]Not elsewhere specified.

[5]Output of limestone and serpentine for dimension stone is included with "Stone: Crushed and broken." In addition to the commodities listed, a variety of other dimension stone was produced and previously listed, but available general information was inadequate to make continued reliable estimates of output.

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TABLE 2
ITALY: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Alumina	Eurallumina S.p.A. (UC Rusal, 56.2%)	Plant at Portoscuso, Sardinia	1,000
Aluminum	Alcoa Italia S.p.A. (Alcoa Inc., 100%)	Smelters at Porto Vesme, Sardinia, and Fusina, near Venice	188
Asbestos	Amiantifera di Balangero S.p.A.	Mine at Balangero, near Turin	100
Barite	Bariosarda S.p.A. (Ente Mineraria Sarda)	Barega and Mont 'Ega Mines on Sardinia	100
Do.	Edem S.p.A. (Government)	Mines at Val di Castello, Lucca	20
Do.	Edemsarda S.p.A. (Soc. Imprese Industriali)	Mines at Su Benatzu, Sto. Stefano, and Peppixeddu, Sardina	20
Do.	Società Mineraria Baritina S.p.A	Mines at Marigolek, Monte Elto, and Primaluna, near Milan	20
Bauxite	Sardabauxiti S.p.A. (Cogein S.p.A., 40%; Comtec S.p.A., 40%; Icofin Co., 20%)	Mine at Olmedo, Sardinia	350
Bentonite	Industria Chimica Carlo Laviosa S.p.A	Mines and plant on Sardinia and a plant near Pisa	250
Cement	52 companies, of which the largest are:		
Do.	Italcementi Fabbriche Riunite Cemento S.p.A.	18 plants, of which the largest are Calusco, Monselice, and Collefero	15,000
Do.	Buzzi Unicem Group	11 plants, of which Guidonia, Lugagnano, Morano, Piacenza, S'Arcangelo di Romagna, and Settimello are the largest	9,000
Do.	Cementerie del Tirreno S.p.A.	6 plants at Arquasta Scivia, Livorno, Maddaloni, Napoli, Spoleto, and Taranto	5,300
Copper:			
Refined	Società Metalli Italia S.p.A.	Refinery at Porto Marghera	60
Refined, secondary	Europametalli - LMI S.p.A.	Refinery at Fornaci di Barga	24
Do.	Sitindustrie S.p.A.	Refinery at Pieve Vergonte	22
Feldspar	At least 5 companies, of which the largest are:	Mines:	1,500
Do.	Maffei S.p.A.	Surface mines at Pinzolo and Campiglia	(200)
Do.	do.	Underground mine at Vipiteno	(300)
Do.	Miniera di Fragne S.p.A.	Surface mine at Alagna Valsesia	(60)
Do.	Sabbie Silicee Fossanova S.P.A.	Surface mine at Fossanova	(30)
Gold kilograms	Sargold Resources plc.	Furtei Mine near Cagliaria, Sardinia	1,400
Gypsum	Fassa S.r.l.	Plant at Moncalvo, Asti	90
Lead, metal	Glencore International AG	Refinery at San Gavino, Sardinia	100
Do.	do.	Kivcet smelter and Imperial smelter at Porto Vesme, Sardinia	80
Lignite	Ente Nazional per l'Energia Electrica	Surface mine at Santa Barbara (closed)	1,000
Lime	Unicale S.p.A.	Plants in Lombardy region	500
Magnesium, metal	Societa Italiana Magnesio S.p.A.	Plant at Bolzano	8
Marble	A number of companies, of which the largest include:	Quarries:	2,000
Do.	Mineraria Marittima Srl	Carrara and Massa areas	(500)
Do.	Industria dei Marmi Vicentini S.p.A.	do.	(300)
Do.	Figaia S.p.A.	do.	(100)
Nitrogen, N content of ammonia	Hydro Agri S.p.A.	Plant at Ferrara	410
Petroleum:			
Crude	Ente Nazional Idrocarburi (Government, 100%)	Oilfields: offshore Sicily, in the Adriatic Sea, and onshore in Po River Valley	90
Refined thousand 42-gallon barrels per day	do.	About 30 refineries	2,000
Potash, ore	Industria Sali Otassici e Affini per Aziono S.p.A.	Underground mines at Corvillo, Pasquasia, Racalmuto, and San Cataldo, Sicily (closed)	1,300
Do.	Sta. Italiana Sali Alcalini S.p.A. (Italkali)	Underground mines at Casteltermini and Pasquasia, Sicily	700

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TABLE 2—Continued
ITALY: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Pumice	Pumex S.p.A.	Quarries, Lipari Island, north of Sicily	600
Do.	Sta. Siciliana per l'Industria ed il Commercio della Pomice di Lipari S.p.A. (Italpomice S.p.A.)	do.	200
Pyrite	Nuova Solmine S.p.A.	Underground mines at Campiano and Niccioleta	900
Salt, rock	Sta Italiana Sali Alcalini S.p.A. (Italkahi)	Underground mines at Petralia, Racalmuto, and Realmonte, Sicily	4,000
Do.	Solvay S.p.A.	Underground mines at Buriano, Pontteginori, and Querceto, Tuscany	2,000
Steel	Ilva S.p.A. (Riva Group)	5 steel plants, the largest of which is Taranto (1,500)	4,000
Do.	Riva Acciaio S.p.A. (Riva Group)	7 steel plants	7,000
Do.	Acciaierie e Ferriere Vicentine Beltrame S.p.A. (AFV-Beltrame S.p.A.)	Steel plant at Vicenza	1,000
Talc	Luzenac Val Chisone S.p.A.	Mines at Pinerolo, near Turin, and at Orani, Sardinia	120
Do.	Talco Sardegna S.p.A.	Mine at Orani, Sardinia	20
Zinc, metal	Glencore International AG	Plant at Porto Vesme, Sardinia	120
Do.	Pertulosa Sud S.p.A.	Plant at Crotone, Calabria	100

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THE MINERAL INDUSTRY OF MALTA

By Harold R. Newman

In 2006, Malta remained an important transshipment center in the Mediterranean area. Its political and strategic importance has traditionally emanated from its geographic position in the center of the Mediterranean Sea and its natural deepwater harbor. The transshipment and reexport of goods continued to be significant to the country's economy. International trade activities represented Malta's economic lifeline.

Production

The mineral industry, which consisted mainly of the quarrying of golden limestone (globigerina) and salt production, all for domestic consumption, was small (table 1). Malta depended almost completely on imports of raw materials and fuels.

The mineral-related economy of the country depended mainly on trade and the storage of crude oil in the Malta Freeport. The Malta Freeport offers modern transshipment facilities, which include storage, assembly and processing operations, and an oil terminal with bunkering facilities.

In 2006, Malta and Tunisia signed an agreement for joint oil exploration in zones of the continental shelf located between the two countries. Both countries agreed to determine the coverage of these zones by setting up a joint group of experts (Alexander's Gas & Oil Connections, 2006).

RWE Dea entered into a farm-in agreement with Global Petroleum Inc. on Malta's offshore exploration Blocks 4 and 5 in area 3 located in the southern area of the Ragusa Trough. RWE Dea planned to conduct seismic work and possibly drill an exploration well (Offshore Engineer, 2006).

More-extensive coverage of the mineral industry of Malta can be found in the 2004 and the 2005 Minerals Yearbook, volume III, Area Reports—International—Europe and Central Eurasia, which are available on the World Wide Web at http://minerals.usgs.gov/minerals/pubs/country.

References Cited

Alexander's Gas & Oil Connections, 2006, Malta and Tunisia sign deal on oil exploration and exploitation: Alexander's Gas & Oil Connections, February 27. (Accessed April 21, 2006, at http://www.gasandoil.com/goc/news/nta61277.htm.)

Offshore Engineer, 2006, Exploration: Offshore Engineer, v. 31, no. 8, August, p. 18.

TABLE 1
MALTA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES[1, 2]

(Cubic meters)

Commodity[3]	2002	2003	2004	2005	2006
Limestone	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000
Salt	13,000	13,000	6,000 r	6,000 r	6,000

rRevised.

[1]Estimated data are rounded to no more than three significant digits.

[2]Table includes data available through April 2007.

[3]In addition to commodities listed, small amounts of cement, fertilizer, lime, and plaster are produced, but available information is inadequate to make reliable estimates of output.

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THE MINERAL INDUSTRY OF THE NETHERLANDS

By Harold R. Newman

The Netherlands was an important regional producer of natural gas and petroleum for the European market and played a major role as a transshipment center for mineral products that entered and left continental Europe. In terms of world production, however, it was a modest producer of metallic and nonmetallic minerals and mineral products.

In 2006, the Dutch economy appeared to be coming out of recession, but the recovery continued to be unsteady. The Dutch economy was heavily dependent on international developments. The export, reexport, and import of goods and services together accounted for more than 60% of the gross domestic product (Holland Trade, 2006).

Rotterdam, which was the world's leading container port and a major European transportation hub, remained extremely important as a shipping and storage center. In 2006, a record 378 million metric tons (Mt) of cargo passed through the Port of Rotterdam compared with 370 Mt in 2005. Throughput of incoming and outgoing materials in 2006, in thousand metric tons, included crude oil (99,091), mineral products (45,919), ores and scrap (38,524), and coal (27,604) (Port of Rotterdam Authority, 2006).

Minerals in the National Economy

The raw materials sector was dominated by natural gas and petroleum production, of which about 40% was from offshore. Mining was confined to the extraction of limestone, peat, and sand and gravel by quarrying and solution mining of salt in the eastern and northern areas of the country. Mining and quarrying accounted for about 3.9% of the value of industrial production (Statistics Netherlands, 2006, p. 122.). Downstream activities included chemical and metallurgical industries, which used mainly imported ores and industrial minerals.

Production

The Staatstoezicht op de Minjnen [State Supervision of Mines] (SodM), which is an agency within the Ministerie van Economische Zaken [Ministry of Economic Affairs], oversees the production of minerals in the Netherlands and the Netherlands part of the continental shelf. The agency ensures, by regulatory authority, that mineral production is carried out in a responsible manner.

Production of most mineral commodities did not change significantly in 2006 with the exception of decreases in secondary aluminum and iron and steel. Data on mineral production are provided in table 1.

Structure of the Mineral Industry

The Government continued to be involved in the energy sector through regulations and oversight of petroleum and natural gas operations. The Government also played a large role in the aviation, chemicals, telecommunications, and transportation sectors. Table 2 is a list of major mineral industry facilities in the Netherlands.

Commodity Review

Metals

Aluminum.—Pechiney Nederland NV (PLN), a subsidiary of Alcan Inc. of Canada, was a producer of extrusion billets and of rolled aluminum slabs. PLN had a production capacity of 213,000 metric tons per year (t/yr) of primary aluminum and 230,000 t/yr of aluminum billets and slabs. PLN announced that it would conduct a strategic review of Netherlands operations, including the potential sale of the aluminum smelter in Vlissing, in which it held an 85% interest. Ongoing negotiations had failed to solve the smelter's problem of how to ensure its requirements for a long-term competitive energy supply. Alcan's strategy was to invest primarily in low-operating-cost smelters. At the energy price levels expected, Alcan stated that the future of Alcan's Vlissingen smelter was no longer guaranteed (Pechiney Nederlands CV, 2006).

Iron and Steel.—The proposed acquisition of the Corus Group by Companhia Siderurgica Nacional (CSN) of Brazil could fall within the scope of the European Union's merger regulations according to the preliminary findings of the European Commission (EC). A final decision had not been reached by yearend, however.

CSN was in competition with Tata Steel of India to acquire Corus. In December 2006, CSN made a $9.6 billion bid for Corus. The battle for Corus came at a time of growing consolidation within the global steel industry. A takeover of Corus by either company would create the world's fifth-largest steel group with the capacity to produce 24 million metric tons per year (Mt/yr) of crude steel (Platts, 2006).

Zinc.—Zinifex Ltd.'s zinc smelter at Budel produced a record 235,913 metric tons (t) of zinc in 2006 exclusively from zinc concentrates from Zinifex's Century Mine in Queensland, Australia. Following an expansion that was completed in 2006, the plant had the capacity to produce 260,000 t/yr. To complement the expansion, Ziniflex planned to install a 35-metric-ton (t) zinc alloy induction furnace. Approximately 80% of total product sales was delivered to customers within 300 kilometers of the plant (Zinifex Ltd., 2006).

Industrial Minerals

Calcium Carbonate.—Omya Netherlands BV's ground calcium carbonate (GCC) plant at Moerdijk started production in midyear 2005 and continued in 2006. The initial capacity of the plant was 500,000 t/yr. GCC had become the leading filler in the production of wood-free paper because of the resulting paper's pure white color and brightness. The marble used to produce the GCC was imported from Omya's mines in Turkey (Industrial Minerals, 2006).

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Magnesium Compounds.—Nedmag Industries Mining & Manufacturing BV was Europe's leading producer of high-grade synthetic dead-burned magnesia and other magnesium compounds. Four wells near Veendam produced brine saturated with bischofite, which rendered a very high-quality brine that contained less than 1% by weight of nonmagnesium chloride salts and had a density of 1.3 kilograms per liter. The brines were used for the fabrication of calcium chloride, dead-burned magnesia, and other magnesium compounds (Nedmag Industries Mining & Manufacturing BV, 2006).

Salt.—Akzo Nobel Salt BV's salt production facilities were located in Delfziji and Hengelo. The main materials used to produce the salt were raw brine, steam, and electricity. The raw brine was produced by solution mining in multi-effect evaporation plants, and the salt was produced using vacuum salt technology. With a capacity of more than 2 Mt/yr, the Hengelo plant was the leading vacuum salt plant in the world. Akzo Nobel focused on salt for chemical transformation (electrolysis), road salt for de-icing, and dried salt for salt specialties businesses (Akzo Nobel Salt BV, 2006).

Mineral Fuels and Other Sources of Energy

When it came to the supply of energy, the Netherlands was active on the international scene in more than one respect. The country supplied energy to Europe, served as the entrepôt for oil products for the whole of northwestern Europe, and was an advocate for sustainable energy practices. Onshore natural gas reserves and offshore petroleum and gas reserves in the North Sea have allowed the Netherlands to make a significant contribution to the European energy supply. About 40% of production was from offshore. Nederlandse Aardolie Maatschappij BV (NAM), which was owned equally by Esso Netherlands B.V., and Royal Dutch Shell Group produced about 75% of the country's total petroleum, including more than 95% of the onshore production [Mbendi Information Services (Pty.) Ltd., 2006].

The Netherlands' two leading energy companies, Essent BV and Nuon BV, reported that they had reached an agreement to merge and form a new company worth $31.2 billion in equity. Essent and Nuon would hold a 55% and a 45% stake, respectively. The combined company, provisionally named EssenNuon, would be among the 10 leading energy companies in Europe with $17 billion in sales and 5 million customers. The Dutch competition authority, as well as the Provinces and municipalities with shares in the companies, would still have to approve the merger officially (Oil News, 2007).

Natural Gas.—BP plc announced that it intended to sell its exploration, production, and gas infrastructure business in the Netherlands, including its onshore and offshore production assets and its Piek Gas Installatie (PGI) at Alkmaar. BP's assets, onshore and offshore, had a net natural gas production of about 1.8 million cubic meters per day. This sale would not affect BP's other business activities, which comprise energy trading, refining, and marketing of fuels and lubricants.

Petroleum.—Veba Oil Nederland BV had an asset portfolio of equities in 29 onshore and offshore licenses and was the operator of the F2a Hanze oilfield development. The Hanze field was set to become the first oilfield to come into production in the Dutch sector of the North Sea in 10 years. The initial production rate was expected to be about 31,500 barrels per day of oil and would double production in that part of the North Sea (Absoft Ltd., 2006).

Chevron Corp. announced that it was inviting offers for its 31% interest in Netherlands Refining Co. (Nerefco), a 400,000-barrel-per-day facility operated by BP, which owned the other 69%. Chevron stated that it did not view Europe as a core part of its downstream business and was decreasing its holdings. The Nerefco refinery is large in size and has the benefit of deep-water access. The refinery had a reconfiguration project underway to increase clean fuels production (Petroleum Economist, 2006).

Renewable Energy.—The first phase of construction on the Egmond aan Zee offshore wind farm was initiated in early 2006. The wind farm, which was located off the Egmond aan Zee coast, would consist of 36 wind turbines with a total capacity of 108 megawatts. On average, the wind turbines would generate enough electricity to meet the needs of 100,000 households in the Netherlands. By yearend 2006, the wind farm was expected to supply the first sustainable electricity to Nuon BV for the Dutch market. The project was expected to cost more than $280 million. Offshore wind energy was expected to be one of the important sources of renewable energy in the Netherlands (Shell Group, 2006).

Outlook

The Port of Rotterdam will continue to be a leading European port, particularly in terms of container traffic, and to play a very important role in the European import and export market. Almost as much cargo is expected to pass through Rotterdam as the numbers two, three, and four ports in Europe—Antwerp, Hamburg, and Marseille—combined. A significant percentage of the cargo coming into the Port was processed at the Port. The Netherlands is expected to continue to be an important exporter of natural gas in the region.

References Cited

Absoft Ltd., 2006, Veba Oil Nederlands: Absoft Ltd. (Accessed April 26, 2007, at http://www.absoft.co.uk/absoft/web/site/CustomerStories/ST_VEBE_OIL_NETH_Pra.asp.)

Akzo Nobel Salt BV, 2006, Salt: Akzo Nobel Salt BV. (Accessed April 26, 2007, at http://www.basechemicals.com/Products+and+Services/Products/Salt.htm.)

Holland Trade, 2006, The Dutch economy: Holland Trade. (Accessed April 26, 2007, at http://www.hollandtrade.com/vko/zoeken/ShowBouwsteen_Year.asp.)

Industrial Minerals, 2006, Netherlands: Industrial Minerals, January, p. 27.

Mbendi Information Services (Pty.) Ltd., 2006, Netherlands—Oil and gas: Mbendi Information Services (Pty.) Ltd. (Accessed October 24, 2007, at http://www.mbendi.co.za/indy/oilg/eu/nl/p0005.htm.)

Nedmag Industries Mining & Manufacturing BV, 2006, Nedmag Industries Mining & Manufacturing—Products. (Accessed October 24, 2007, at http://www.nedmag.nl/index.php?option=com_content&task=section&id=4&Intem=12.)

Oil News, 2007, Two largest Dutch energy companies to merge: Alexander's Gas & Oil Connections, February 2. (Accessed October 23, 2007, at http://www.gasandoil.com/goc/company/cne70933.htm.)

Pechiney Nederlands CV, 2006, Strategic review of potential sale: Pechiney Nederlands CV. (Accessed October 23, 2007, at http://www.earthtimes.org/articles/show/news_press_release8876.shtml.)

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Petroleum Economist, 2006, Refineries for sale: Petroleum Economist, September, v. 73, no. 9, p. 35.
Platts, 2006, EC reserves judgment on CSN bid for steelmaker Corus: Platts. (Accessed January 9, 2007, at http://www.platts.com/Metals/ews/8819220.xml.)
Port of Rotterdam Authority, 2006, The Port in brief: Port of Rotterdam Authority. (Accessed October 25, 2007, at http://www.portofrotterdam.com/en/facts_figures/port_description/index.jsp.)
Shell Group, 2006, Egmond aan Zee offshore wind farm—Start of construction: Shell Group. (Accessed October 25, 2007, at http://www.shell.com/home/content/rw-br/news_and_library/press_releases/2006/noordzeewind4_2004.html.)
Statistics Netherlands, 2006, Statistical yearbook of the Netherlands 2006, Voorburg, Netherlands, Statistics Netherlands, 213 p.
Zinifex Ltd., 2006, Budel overview: Zinifex Ltd. (Accessed August 27, 2007, at http://www.zinifex.com/IndexPrint.aspx?link_id=18.772.)

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TABLE 1
NETHERLANDS: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2002	2003	2004	2005	2006[e]
METALS						
Aluminum, metal:						
Primary		284,000	277,900	326,300	340,700 [r]	312,300 [3]
Secondary[e]		120,000	50,000 [3]	50,000	50,000	30,000
Cadmium, metal, primary		485	495	572	575	570
Iron and steel:						
Ore, sintered, from imports[e]		3,000,000	3,000,000	3,000,000	3,000,000	3,000,000
Metal, pig iron, including blast-furnace ferroalloys (if any)		5,367,000 [r]	5,846,000 [r]	6,011,000 [r]	6,031,000 [r]	5,417,000 [3]
Steel:						
Crude		6,117,000	6,587,000	6,848,000	6,919,000 [3]	6,372,000 [3]
Semimanufactures		5,511,000 [r]	5,870,000 [r]	6,285,000 [r]	6,134,000 [r]	6,394,000 [3]
Lead, metal, refined, secondary[e]		22,000	22,000	20,000	17,000 [3]	17,000
Zinc, metal, primary		203,400	222,700	228,100	231,800 [3]	235,913 [3]
INDUSTRIAL MINERALS						
Cement, hydraulic[e]	thousand metric tons	3,085 [r, 3]	2,450 [r]	2,380 [r]	2,400 [r]	2,400
Magnesium compounds:[e]						
Chloride		25,000	25,000	25,000	25,000	25,000
Oxide		10,000	10,000	10,000	10,000	10,000
Nitrogen, N content of ammonia[e]	thousand metric tons	2,053 [3]	1,750 [e]	1,970	1,700	1,800
Salt, all types[e]	do.	5,000	5,000	5,000	5,000	5,000
Sand, industrial[e]	do.	15	15	15	15	15
Sodium compounds, n.e.s.:[e, 4]						
Carbonate, synthetic		350,000	350,000	350,000	350,000	350,000
Sulfate:						
Natural		20,000	20,000	20,000	20,000	20,000
Synthetic		15,000	15,000	15,000	15,000	15,000
Sulfur:						
Elemental byproduct:						
Of metallurgy		124,000	131,000	137,000	135,000	130,000
Of petroleum and natural gas		373,000	408,000	410,000	400,000	400,000
Total		497,000	539,000	547,000	535,000	530,000
Sulfuric acid, anhydrous, H_2SO_4[e]		1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
MINERAL FUELS AND RELATED MATERIALS						
Coke, metallurgical[e]		2,300,000	2,300,000	2,200,000	2,200,000	2,200,000
Gas, dry natural:						
Gross	million cubic meters	89,111 [r]	85,714 [r]	101,099 [r]	83,498 [r]	84,000
Marketed[e]	do.	74,000	74,000	74,000	74,460 [r]	73,300 [3]
Natural gas liquids[e]	thousand 42-gallon barrels	160,000	160,000	160,000	160,000	160,000
Petroleum:						
Crude	do.	16,790	17,134 [r]	15,564 [r]	11,858 [r]	11,426 [3]
Refinery products:						
Liquefied petroleum gas	do.	54,093	55,443	55,000 [e]	53,118 [r]	55,000
Gasoline, motor	do.	133,225	132,933	130,000 [e]	120,278 [r]	130,000
Naphtha and white spirit	do.	90,000 [e]	90,000 [e]	90,000 [e]	90,000 [e]	90,000
Kerosene and jet fuel	do.	52,451	56,466	55,000 [e]	58,772 [r]	55,000
Refinery fuel and loss	do.	25,879	27,046	30,000 [e]	30,000 [e]	30,000
Diesel oil	do.	146,073	155,086	150,000 [e]	157,563 [r]	150,000
Residual fuel oil	do.	81,979	79,862	80,000 [e]	79,771 [r]	80,000
Unspecified	do.	161,146	179,653	175,000 [e]	211,993 [r]	200,000
Total	do.	744,846 [r]	776,489 [r]	765,000 [e]	801,495 [r]	790,000

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised.

[1]Table includes data available through October 2007.

[2]In addition to the commodities listed, the Netherlands produced limestone, peat, and construction materials, such as sand and gravel, but output was not reported and no basis exists to make reliable estimates of production.

[3]Reported figure.

[4]Not elsewhere specified.

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TABLE 2
NETHERLANDS: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum:				
Primary		Pechiney Nederland NV (Alcan Inc., 85%)	Plant at Flushing (Vlissingen)	213
Do.		Corus Group	Smelter at Delfzijl	100
Billets		Pechiney Nederland NV (Alcan Inc., 85%)	Plant at Flushing (Vlissingen)	230
Secondary		Alumax Recycling BV	Smelter at Kerkade	50
Cadmium	metric tons	Budel Zinc BV (Ziniflex Ltd.)	Plant at Budel-Dorplein	650
Calcium carbonate, ground		Omya Netherlands BV	Plant at Moerdijk	500
Cement		Eerste Nederlandse Cement Industrie NV	Ten plants at Maastrict	2,700
Do.		Cementfabriek IJmuiden BV	Three plants at Ijmuiden	1,600
Do.		Cementfabriek Rozenburg BV	Two plants at Rozenburg	920
Lead		Hollandse Metallurgische Industrie Billiton BV	Electrolytic plant at Arnhem	35
Do.		Billiton Witmetaal BV	Electrolytic plant at Naarden	6
Limestone		Ankerpoort NV (Lhoist SA, 100%)	Mines at Maastricht and Winterswijk	600
Magnesia		Nedmag Industries Mining & Manufacturing BV	Plant at Veendam	130
Do.		MAF Magnesite BV	Plant at Schiedam	40
Natural gas	million cubic meters	Nederlandse Aardolie Maatschappij BV (NAM)	Groningen, Leeuwarden, Assen, and other onshore gasfields and several offshore wells in the North Sea	225
Petroleum, crude	42-gallon barrels per day	Amoco Inc., Conoco Inc., and Unocal Inc.	766 wells (204 producing), including North Sea fields: Haven, Helder, Helm, Hoorn, Kotter, Logger, and Rijn	83,500
Do.	do.	Nederlandse Aardolie Maatschappij BV (NAM) (Exxon Mobil Corp., 50%)	Onshore fields: Berkel, DeLier, Ijselmonde, Meerkapelle, Pernis, Pinacke, Rotterdam, Schoonebeck, West, Werkendam, and Zoetemeer	20,500
Do.	do.	Veba Oil and Gas Netherlands BV	Hanze field, North Sea	31,500
Petroleum, refinery		Six companies, of which the major ones are:	Refineries, of which:	1,230,500
		Netherlands Refining Co. (BP plc, 69%, and Chevron Corp., 31%)	Rotterdam	(446,000)
		Shell Nederland Raffinaderij BV	Pernis	(374,000)
		Esso Nederland BV	Rotterdam	(175,000)
		Total Raffinaderij Nederland NV	Vlissingen	(150,000)
Salt		Akzo Nobel Salt BV (Akzo Nobel NV, 100%)	Mines, of which:	4,100
			Hengelo	(2,100)
			Delfzijl	(2,000)
Sand, silica		Sigrano Nederland NV (Sibelco Group)	Mines and plants at Heerlin and Maastricht	500
Do.		Lieben Minërals BV	Mines at South Limburg	150
Sodium:				
Carbonate, synthetic		Brunner Mond Group	Plant at Delfzijl	380
Sulfate, synthetic		do.	do.	600
Steel		Corus Group	Plant at Ijmuiden	7,000
Zinc		Budel Zinc BV (Ziniflex Ltd.)	Plant at Budel-Dorplein	260

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THE MINERAL INDUSTRY OF NORWAY

By Harold R. Newman

Since the discovery of North Sea petroleum, petroleum production has become Norway's most important mineral industry activity, and petroleum, the country's most significant mineral commodity followed by, in order of value, industrial minerals and metals. The metals mining industry has declined owing to exhausted ore reserves. The country's long shoreline and close proximity to the large European Union market were major competitive advantages for some raw materials, particularly aggregate, natural stone, and certain other industrial minerals.

Norway's production of olivine accounted for 66% of world production; production of titanium accounted for 7.2% of world production; and production of petroleum accounted for 6.2% of world production. Norway was the world's third ranked exporter of petroleum after Saudi Arabia and Russia (Norwegian Geological Survey, 2006).

Minerals in the National Economy

The mining and quarrying industry was a regional industry, strongly represented along the coast. About 75 million metric tons of mineral resources was extracted in 2006, representing a value of $1.8 billion. Sales of industrial minerals increased slightly to $545 million in 2006 from $528 million in 2005, and sales of metallic ore increased to $207 million in 2006 from $132 million in 2005. In 2006, the total export value of the mining and quarrying industry, excluding mineral fuels, was $1.1 billion (Norwegian Geological Survey, 2006).

Production

Norway produced aluminum, cadmium, cobalt, copper, ferroalloys, nickel, and zinc. Mine production included feldspar, graphite, ilmenite, iron ore, and limestone. Aggregate and sand and gravel deposits were some of Norway's economically important mineral raw materials. The petroleum sector, however, was the most significant contributor to Norway's economic vitality. Revenues from petroleum activities were projected to be about 23% of the gross domestic product in 2006 (International Monetary Fund, 2006).

Structure of the Mineral Industry

The Norwegian mineral industry was composed of a mixture of Government and privately owned operations. Table 2 lists the major mineral companies that were operating in Norway, their ownership, and their respective mine and plant capacities.

Commodity Review

Metals

Aluminum.—Norsk Hydro ASA announced that the Norwegian Pollution Control Authority had granted it a 10-month deferral (from January 1, 2007) for the shutdown of the Soderberg potline at its 267,000-metric-ton-per-year (t/yr) Karmoy aluminum smelter. Norsk Hydro was being compelled to shut down 25% of its aluminum smelting capacity, which used outdated Soderberg technology, in Norway because the technology did not meet new environmental standards. Some 22,000 t/yr of capacity was shut down at Hoyanger in early 2006. Soderberg technology is based on open cells, and produces higher carbon emissions and yields lower productivity than more modern cells with pre-baked anodes (Mining Journal, 2006).

Nickel.—LionOre Mining International Ltd. of Canada announced plans to buy Canada-based Falconbridge Ltd.'s Nikkelverk nickel refinery for $650 million. The proposed transaction would be financed with $400 million in cash and $250 million in LionOre shares, which would give Falconbridge an 18.4% stake in LionOre. The transaction agreement included approval of a 10-year contract with Falconbridge to supply up to 60,000 t/yr of nickel concentrate to Nikkelverk (680News, 2006).

Industrial Minerals

Norway was a significant producer of industrial minerals from more than 30 mines. On a global scale, Norwegian olivine was very important, accounting for 66% of world production; ilmenite was also a globally important commodity with 14% of world production (Industrial Minerals, 2006).

Mineral Fuels

Petroleum.—The country's petroleum production capacity was about 3 million barrels per day. Norway was the world's third ranked petroleum exporter after Saudi Arabia and Russia and the seventh ranked natural gas exporter. It provided much of Western Europe's oil and gas requirements, particularly those of France, Germany, and the United Kingdom. The country had estimated proven reserves of 7.7 billion barrels of oil as of January 2006 (U.S. Energy Information Administration, 2006).

In March 2006, the Government offered 192 oil exploration blocks in one of the largest licensing rounds in 40 years and the third-largest since oil exploration began offshore Norway in 1965. Through a program called Awards in Predefined Areas (APA), the Government encourages companies to explore untested blocks in mature areas (where there are already fields in production) to boost capacity at a lower cost by using existing pipelines and platforms. Partly because of near-record crude oil prices, the Government expected that there would be strong interest in APA blocks (Alexander's Gas & Oil Connections, 2006b).

The Norwegian Petroleum Directorate stated that Norway needed to open up new offshore areas and step up the search in existing areas if it were to remain a key oil exporter. Oil production was declining by about 4% per year since it had

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peaked in 2000. The Government was also pushing the search for new supplies north in Arctic waters (Alexander's Gas & Oil Connections, 2006a).

Outlook

Norway is expected to continue to obtain nearly all its electricity from hydropower. Norway's economy is highly dependent upon the country's hydrocarbon resources, and the Government will continue to manage them—they are the country's leading single source of revenue. The Government will also continue to encourage exploration in the Barents Sea, which it considers to be a potential source for new oil production and which has the potential to host large quantities of oil reserves.

References Cited

680News, 2006, LionOre to buy Falconbridge refinery in Norway, Toronto, Canada, 680News, June 7. (Accessed February 24, 2008, via http://www.680news.com/news/business/article.jsp.)

Alexander's Gas & Oil Connections, 2006a, Norway needs to step up offshore exploration: Alexander's Gas & Oil Connections, December 21. (Accessed February 24, 2008, at http://www.gasandoil.com/goc/news/nte65170.htm.)

Alexander's Gas & Oil Connections, 2006b, Norway offers 192 oil exploration blocks: Alexander's Gas & Oil Connections, March 9. (Accessed February 24, 2008, at http://www.gasandoil.com/goc/news/nte61061.htm.)

Industrial Minerals, 2006, Nordic mineral supply: Industrial Minerals, no. 467, August, p. 28.

International Monetary Fund, 2006, Norway, *in* World economic outlook database: Washington, DC, International Monetary Fund. (Accessed August 1, 2008, via http://imf.org/external/pubs/ft/weo/2007/01/index.htm.)

Mining Journal, 2006, Hydro granted Karmoy deferral: Mining Journal, December 6. (Accessed February 24, 2008, at http://www.mining-journal.com/Journal_Article.aspx?articleid=12882&sectionid=30.)

Norwegian Geological Survey, 2006, Mining and quarrying industry in 2006: Trondheim, Norway, Norwegian Geological Survey. (Accessed February 24, 2008, at http://www.ngu.no/en-gb/hm/Publications/reports/2008/mineral-resources-in-norway_2006.aspx.)

U.S. Energy Information Administration, 2006, Norway: U.S. Energy Information Administration country analysis brief, August. (Accessed February 24, 2008, at http://www.eia.doe.gov/emeu/cabs/Norway/Full.html.)

TABLE 1
NORWAY: PRODUCTION OF MINERAL COMMODITIES[1]

(Thousand metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006[e]
METALS						
Aluminum:						
Primary	metric tons	1,095,500	1,192,400	1,321,700	1,376,500	1,422,000 [2]
Secondary	do.	271,000	256,800	348,700	362,400	349,200 [2]
Cadmium, smelter	do.	209	331	260	260	250
Cobalt:						
Mine output, Co content[e]	do.	100	--	--	--	--
Metal, refined	do.	3,994	4,556	4,670	5,021	4,927 [2]
Copper, metal, refined, primary and secondary	do.	30,500	35,900	35,600	38,500	39,700
Iron and steel:						
Iron ore and concentrate, Fe content		350 [e]	340	408	420 [e]	400
Metal:						
Pig iron[e]		80	90	90	90	100
Ferroalloys:[e]						
Ferrochromium		61 [2]	-- [2]	-- [2]	-- [2]	-- [2]
Ferromanganese		240	245	245	130 [r]	130
Ferrosilicomanganese		230	230	260 [r]	290 [r]	250
Ferrosilicon, 75% basis		390	350	300	165 [r]	80
Silicon metal		105	100	194 [r]	176 [r]	175
Other		15	15	15	60 [r]	60
Total		1,040	940	1,010 [r]	820 [r]	700
Steel, crude		694	698	695	701 [r,2]	679 [2]
Semimanufactures, rolled[e]		630	635	640	650	600
Magnesium, primary	metric tons	10,000 [e]	--	--	--	--
Nickel:						
Mine output:						
Concentrate[e]	do.	12,000	--	--	--	--
Ni content	do.	2,052	169	181	342 [r]	362 [2]
Metal, primary	do.	68,500	77,200	71,400	84,900	82,000
Platinum-group metals[3]	kilograms	15,600	--	--	--	--
Titanium:[e]						
Ilmenite concentrate		750	840 [2]	860	860	850
TiO_2 content		340	378 [2]	387	388	385
Zinc, metal, primary	metric tons	144,538 [r]	143,627 [r]	140,900 [r]	151,285 [r]	160,700 [2]

See footnotes at end of table.

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TABLE 1—Continued
NORWAY: PRODUCTION OF MINERAL COMMODITIES[1]

(Thousand metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006[e]
INDUSTRIAL MINERALS						
Cement, hydraulic[e]		1,850	1,860	1,870	1,900	1,850
Feldspar[e]	metric tons	75,000	74,000	75,000	88,690 [2]	86,000
Graphite[e]	do.	2,400	2,400	2,300	8,893 [2]	9,000
Lime, hydrated, quicklime[e]		100	100	100	100	100
Mica, flake[e]	metric tons	2,600	2,600	2,600	2,700	2,700
Nepheline syenite[e]		310	300	300	300	300
Nitrogen, N content of ammonia		330	354	420	300	350
Olivine sand[e]		3,200	3,100	3,100	3,100	3,000
Stone, crushed:[e]						
Dolomite		900	850	850	513 [2]	525
Limestone		7,400	7,200	7,300	7,200	7,200
Quartz and quartzite		1,400	1,500	1,500	909 [2]	1,000
Sulfur, byproduct:						
Metallurgical		102	100	85	80	80
Petroleum[e]		19	20	18	20	20
Total[e]		121	120	103	100	100
Talc, soapstone, steatite[e]		28	28	28	26 [2]	27
MINERAL FUELS AND RELATED MATERIALS						
Coal, all grades[e]		310	300	300	300	300
Gas, natural, marketed[4]	million cubic meters	65,501	73,124	78,465	84,964	84,000
Peat, for agricultural use[e]	do.	30	30	30	30	30
Petroleum:						
Crude[5]	thousand 42-gallon barrels	1,092,800	1,041,400	1,024,400	964,290	1,016,890 [2]
Natural gas liquids[e]	do.	41,000	42,000	52,695 [2]	60,879 [2]	60,000
Refinery products:[e]						
Naphtha	do.	27,000	27,000	8,741 [2]	10,017 [2]	10,000
Gasoline	do.	26,000	27,000	23,913 [2]	28,078 [2]	28,000
Kerosene	do.	9,000	9,000	4,774 [2]	5,771 [2]	5,800
Distillate fuel oil	do.	46,000	47,000	45,765 [2]	50,121 [2]	50,000
Residual fuel oil	do.	12,000	12,000	13,823 [2]	11,806 [2]	12,000
Other products	do.	5,000	5,000	3,351 [2]	4,194 [2]	4,000
Refinery fuel and losses	do.	5,000	5,000	2,757 [2]	2,977 [2]	3,000
Total	do.	130,000	132,000	103,124 [2]	112,964 [2]	112,800

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. -- Zero.
[1]Table includes data available through August 31, 2007.
[2]Reported figure.
[3]Data represent exports.
[4]Reported as total methane sales.
[5]Excluding natural gas liquids.

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TABLE 2
NORWAY: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum		Hydro Aluminium ANS (Norsk Hydro A/S, 70%)	Smelters at Ardal, Hoyanger, Karmoy, and Sunndal	600
Do.		do.	Plant at Holmestrand	90
Do.		Elkem Aluminium ANS (Elkem A/S, 50%, and Alcoa Inc., 50%)	Smelters at Farsund and Mosjoen	250
Do.		Sor-Norge Aluminium A/S (Alusuisse Group, 50%, and Hydro Aluminium ANS, 49%)	Smelter at Odda	50
Cadmium		Norzink A/S (Outokumpu Oyj, 100%)	Smelter at Eitrheimsneset	0.3
Cement		Norcem A/S	Plants at Brevik and Kjopsvik	2,150
Coal		Store Norske Spitsbergen Kulkompani A/S	Mines at Longyearbyen and Svea	450
Cobalt		Nikkelverk A/S (Falconbridge Nickel Mines Ltd., 100%)	Smelter at Kristiansand	5
Copper:				
Ore, Cu content		Nikkel og Olivin A/S (Outokumpu Oyj, 100%)	Mine at Narvik	1
Metal		Nikkelverk A/S (Falconbridge Nickel Ltd., 100%)	Smelter at Kristiansand	40
Dolomite		Franzefoss Bruk A/S	Mine at Ballagen	350
Do.		Norwegian Holding A/S	Mines at Hammerfall, Logavlen, and Kvitblikk	500
Feldspar		Franzefoss Bruk A/S	Mine at Lillesand	100
Ferroalloys		Elkem Salten (Elkem A/S, 100%)	Ferrosilicon plant at Straumen	90
Do.		Elkem Bjolvefossen (Elkem A/S, 100%)	Ferrosilicon plant at Alvik	60
Do.		Elkem Thamshavn (Elkem A/S, 100%)	Ferrosilicon plant at Orkanger	60
Do.		Finnfjord Smelteverk A/S, Rana Metal (FESIL ASA, 100%)	Ferrosilicon plant at Mo i Rana	110
Do.		A/S Hafslung Metal (FESIL ASA,100%)	Ferrosilicon plant at Sarpsborg	75
Do.		Ila og Lilleby Smelteverk (FESIL ASA, 100%)	Ferrosilicon plant at Finnsnes	20
Do.		Oye Smelteverk (Tinfos Jernverk A/S, 100%)	Silicomanganese plant at Kvinesdal	235
Iron, metal		Ulstein Jernstoperi A/S	Hordvikneset	10
Iron ore		Rana Gruber A/S (Norsk Jernverk Holding A/S, 100%)	Mine at Mo i Rana	2,000
Do.		Arctic Bulk Minerals A/S	Mine and plant at Kirkenes	1,500
Lime		Hylla Kalkverk (Nikolai Bruch A/S, 100%)	Verdal/Trondheim Mine and plant	80
Do.		A/S Norsk Jernverk	Plant at Mo i Rana	48
Do.		Ardal og Sunndal Verk A/S	More og Romsdal Mine at Surnadal	20
Do.		Breivik Kalkverk A/S	Alesund Mine at Larsnes	20
Do.		Mjoendalen Kalkfabrik	Plant at Asen/Drammen	7
Limestone		Norcem A/S	Dalen, Bjorntvedt, and Kjopsvik Mines	1,600
Do.		Vardelskalk A/S (Franzefoss Burk A/S, 100%)	Sandvika Mine	800
Do.		Breivik Kalkverk A/S	Visnes and Glaerum Mines	500
Magnesium		Norsk Hydro A/S (Government, 51%)	Plants at Porsgrunn and Sauda	50
Manganese, alloys		Eramet SA	do.	500
Natural gas	million cubic meters	Statoil ASA	Gama, Gullfaks, Sleipner Ost, and Statfjord Fields	12,270
Do.	do.	Phillips Petroleum Company Norway	Ekofisk Field	9,900
Do.	do.	Elf Petroleum Norge A/S	Frigg, Heimdal, and Ost-Frigg Fields	5,750
Do.	do.	Norsk Hydro Produksjon A/S	Troll-Oseberg Field	2,600
Do.	do.	Statoil ASA	Mikkel Field	2,100
Do.	do.	Total, 40%; Petoro, 30%; Marathon Petroleum Norge AS, 20%; Norsk Hydro Produksjon A/S, 10%	Skirne Field	1,550
Do.	do.	BP Petroleum Development of Norway	Gyda and Ula Fields	1,040
Do.	do.	Esso Norge A/S	Odin Field	1,000
Do.	do.	Amoco Norway A/S	Hod and Valhall Fields	910
Nepheline syenite		North Cape Mineral A/S (Unimin Corp., 84%)	Mine at Stjernoy	350
Nickel:				
Ore, Ni content		Nikkel og Olivin A/S (Outokumpu Oyj, 100%)	Mine at Narvik	3
Do.		Titania A/S (Kronos Norge A/S, 100%)	Mine at Tellnes	0.5
Metal		Nikkelverk A/S (Falconbridge Nickel Mines Ltd., 100%)	Smelter at Kristiansand	85
Olivine		A/S Olivin	Aheim Mine and plant	2,500
Do.		do.	Stranda Mine and plant	300
Do.		Franzefoss Bruk A/S	Lefdal Mine at Bryggja	500

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TABLE 2—Continued
NORWAY: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Petroleum	42-gallon barrels per day	Statoil ASA	Gullfaks, Statfjord, Tommeliten, and Veslefrikk Fields	1,069,300
Do.	do.	Norsk Hydro Produksjon A/S	Brage, Mime, and Oseberg Fields	566,200
Do.	do.	Phillips Petroleum Company Norway	Ekofisk Field	237,500
Do.	do.	Saga Petroleum A/S	Snorre Field	170,000
Do.	do.	BP Petroleum Development of Norway	Gyda and Ula Fields	155,000
Do.	do.	A/S Norske Shell	Draugen Field	90,000
Do.	do.	ExxonMobil Refining & Supply Co.	Slagen Refinery	110,000
Do.	do.	Statoil Mongstad	Mongstad Refinery	200,000
Pyrite		Folldal Verk A/S (Norsulfid A/S, 100%)	Mine at Hjerkinn	10
Quartzite		Elkem Tana (Elkem A/S, 100%)	Mine at Tana	540
Do.		Elkem Marnes (Elkem A/S, 100%)	Mine at Sandhornoy	200
Do.		Vatnet Kvarts A/S	Mine at Nordland	150
Do.		Snekkevik Kvartsbrudd	Mine at Kragero	110
Silicon metal		Lilleby Metall A/S (FESIL ASA, 100%)	Plant at Trondheim	9
Do.		FESIL ASA	Plant at Holla	50
Steel		Fundia AB (Norsk Jenverk, 50%, and Rautaruukki Group, 50%)	Plants at Christiania, Mandal Stal, Mo i Rana, and Spigerverk	600
Talc		A/S Norwegian Talc (Pluess-Staufer AG, 51%)	Mine and plant at Altermark/Knarrevik and Framfjord	90
Do.		Kvam Minerals A/S	Mine and plant at Kvam	6
Titanium, concentrate		Titania A/S (Kronos Norge A/S, 100%)	Mine at Tellnes	800
Zinc, metal		Norzik A/S (Outokumpu Oyj, 100%)	Smelter at Odda	150

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The Mineral Industry of Portugal

By Alfredo C. Gurmendi

In 2006, Portugal was a significant European minerals producer and one of Europe's leading copper producers. It was also a significant world producer of feldspar (eleventh after Italy, Turkey, and others), lithium (seventh after Chile, China, Australia, and others), and tungsten (sixth after China, Russia, Canada, and others) (MBendi Information Services (Pty) Ltd., 2007a; Ober, 2007; Potter, 2007; Shedd, 2007).

Portugal's Iberian Pyrite Belt (IPB) is one of the most mineralized geological provinces of Western Europe and is geologically complex. Massive sulfides linked to synorogenic volcanism were deposited in the southwestern part of the Iberian Peninsula where the IPB's volcanogenic massive sulfide (VMS) deposits are located. These deposits date to the Upper Devonian and the Lower Carboniferous ages and were deposited during submarine felsic volcanism. The IPB, which has 85 known VMS deposits, was an important source of base metals in the European Union (EU) (MBendi Information Services (Pty) Ltd., 2007a).

Minerals in the National Economy

Portugal has considerable mineral wealth. The most important metallic mineral resources are copper, tin, tungsten, and uranium. The most important resources of industrial minerals are high-quality marble, pyrites, and rock salt. The country has limited energy resources and depended upon imports for the bulk of its energy needs (MBendi Information Services (Pty) Ltd., 2007a, b; U.S. Energy Information Administration, 2007).

Portugal's economy had become a diversified and increasingly service-based one since the country joined the EU in 1986. In 2006, the Government continued with the country's privatization program and was proceeding with legislation that would privatize many state-owned companies. The privatization effort was part of a broader program to reduce the role of the state in the economy and to encourage the economy to be more market oriented. Privatization was helping the country to regain confidence in the Government's macroeconomic management and to create conditions for lower inflation and interest rates. The mining and mineral processing industries represented almost 1% of the gross domestic product (GDP) in 2006. The minerals sector employed about 1% (33,000) of the industrial sector's total (3.3 million). As a target for foreign direct investment, Portugal has been overshadowed by lower-cost producers in Central Europe and Asia (Instituto Nacional de Estatística, 2007; U.S. Central Intelligence Agency, 2007; U.S. Department of State, 2007).

Production

Portugal's industrial minerals sector was a modern and efficient producer of a variety of materials, most notably dimension stone and minerals for the manufacture of ceramics. The dimension stone industry continued to be an important segment of the mining industry in terms of value and trade. The country was one of the leading producers of mined copper in the EU and an important producer of salt rock, talc, and tungsten concentrates (table 1).

Structure of the Mineral Industry

Primary Metals Inc. (PMI) of Canada, through its subsidiary Beralt Tin & Wolfram S.A., mined tungsten at its Panasqueira Mine, which is located in central Portugal (Primary Metals Inc., 2007). On October 19, 2006, the Canadian corporations Eurozinc Mining Corp. and Lundin Mining Corp. merged into a joint venture, which was consolidated before yearend. The new company, Lundin Mining Corp. (LMC), became a part of the European copper, lead, and zinc industries. In Portugal, LMC acquired the Aljustrel zinc-lead-silver project and the Neves Corvo copper-zinc mine and was set to conduct greenfields exploration for base and precious metals near the Neves Corvo Mine as well (Lundin Mining Corp., 2007a, b).

Lusosider Aços Planos S.A. and SN Servicos S.A. were the major steel producers. Cimentos de Portugal S.A. (Cimpor) was an important producer of cement. With the exception of copper, dimension stone, and tungsten, production of other minerals and related materials had only domestic significance. Some of the leading mineral-related companies were partially owned or controlled by the Government, and some operations were privately owned (table 2).

PMI reported favorable results of underground gold sampling at its Quinta/Banjas gold property, which covers 44 square kilometers and is located about 20 kilometers (km) to the east of Porto City. The auriferous occurrences were generally associated with structural zones that consist of faults, shears, fractures, and deformation corridors, which control the gold mineralization. PMI also announced that its Argimela tin deposit in eastern Portugal has a potential for oxide tin (cassiterite) and was in the development stage (Primary Metals Inc., 2007).

Commodity Review

Metals

Copper.—Production from the Neves Corvo Mine was 78,660 metric tons (t) in concentrate compared with 89,541 t in 2005, which was a decrease of 12.2%. The country's copper output was valued at $385 million, which was 26.5% higher than that of 2005; the increase in value was a result of the increase in the price of copper to $2.829 per pound in 2006 from $1.549 per pound in 2005. The Neves Corvo Mine was one of the highest-grade copper mines in the world. It consisted of five ore bodies that contain copper, tin, and zinc. In 2006, zinc production supplanted tin production, as there were insufficient tin reserves remaining in the deposit to support full-time production. The mine had proven copper reserves of 6,835 Mt at an average

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grade of 5.73%, probable copper reserves of 9,975 Mt at an average grade of 5.29%, and probable zinc reserves of 10,626 Mt at an average grade of 7.96% (table 1; Instituto Nacional de Estatística, 2007; Lundin Mining Corp., 2007a, b).

Tungsten.—Production from the Panasqueira tungsten mine in Beira Baixa Province of central Portugal was 780 t in concentrate (W content) compared with 816 t in 2005, which was a decrease of 4.4%, owing to low tungsten prices. China is believed to have recently surpassed Europe as the leading user of tungsten, followed by the United States, Japan, Russia, and others. The Panasqueira Mine continued to be one of the world's leading producers of tungsten concentrates outside of China and produced a 75% tungsten oxide (WO_3) concentrate. On June 23, 2006, PMI announced that the mine has proven and probable reserves of 1.4 million metric tons (Mt) at a grade of 0.233% WO_3 and additional indicated resources (3.3 Mt at a grade of 0.263% WO_3) and inferred resources (1.6 Mt at a grade of 0.224% WO_3). PMI announced that there was development progress at the mine where new underground equipment was introduced and a refurbishment program was underway. The main end-use application for tungsten was in the manufacture of cemented carbides (60%), steel and alloy (21%), electrical and electronics (11%), and catalysts and pigments (8%) (table 1; Primary Metals Inc., 2007).

Industrial Minerals

Cement.—Cimpor was Portugal's leading cement producer and was the second ranked cement company on the Iberian Peninsula after Cemex SA. In addition to cement, Cimpor also produced aggregates, precast concrete products, and dry mortars. The development of Portugal's infrastructure was expected to create a substantial demand for Cimpor's products in the coming years (Hoover's, Inc., 2006).

Stone, Dimension.—Marble was the most valuable of the country's stone products and accounted for the majority of stone production. The main area for marble quarrying continued to be the Evora District (Hoover's, Inc., 2006).

Mineral Fuels

Petroleum, Natural Gas, and Coal.—Portugal had limited domestic energy resources and imported about 90% of its energy requirements, of which about 66% was petroleum; 10%, natural gas; and 5%, coal for electricity generation. The country's leading domestic energy resource was hydropower, but at times it was unreliable, because it depended on rainfall. Portugal had two oil refineries that were operated by Petróleos de Portugal (Petrogal). They were located in the Porto and the Sines terminals, which had a combined capacity of 305,000 barrels per day (bbl/d). The Government of Portugal was planning to invest $1.8 billion to upgrade the country's refining processes by 2010. The Government also planned to invest about $11 billion in renewable energy projects by 2012, of which wind power's infrastructure would cost about $2.3 billion. The Government signed an agreement with Argus Resources of the United Kingdom to build a petroleum refinery that would be the largest, in terms of production, on the Iberian Peninsula. The project would be built 90 km south of Lisbon at Sines. The refinery, which was to be completed by 2010, was expected to cost $4.7 billion and would have a production capacity of 250,000 bbl/d (Alexander's Gas & Oil Connections, 2007; MBendi Information Services (Pty) Ltd., 2007b).

Outlook

Several gold and base-metal projects were undergoing feasibility studies and most of them are focused on the Portuguese Zone of the IPB. The IPB is a focus of interest for mining companies and a prime target for exploration activities because it appears to have a good potential for success on the basis of the large VMS deposits discovered so far. Increased production of granite, marble, and slate in Portugal is also possible. Owing to its dependence on imported energy, the Portuguese Government plans to increase its investments in hydropower, solar power, wave power, and wind power.

References Cited

Alexander's Gas & Oil Connections, 2007, Portugal plans EUR 8.1 bn investment in renewable energy by 2012: Alexander's Gas & Oil Connections. (Accessed October 3, 2007, at http://www.gasandoil.com/goc/news/nte71728.htm.)

Hoover's, Inc., 2006, Cimentos de Portugal S.A.: Hoover's, Inc. (Accessed June 27, 2006, via http://www.hoovers.com.)

Instituto Nacional de Estatística, 2007, Statistics Portugal: Instituto Nacional de Estatística. (Accessed October 2, 2007, at http://www.ine.pt/portal/page/portal/PORTAL_INE/Listpinforma.)

Lundin Mining Corp., 2007a, President's message—Annual report 2006: Lundin Mining Corp. (Accessed October 1, 2007, at http://www.lundinmining.com/s/PresidentsMessage.asp?ReportID=208273&_Title=Annual-Report-2006.)

Lundin Mining Corp., 2007b, Lundin Mining—A premier base metal investment: Lundin Mining Corp., 34 p. (Accessed October 1, 2007, via http://www.lundinmining.com.)

MBendi Information Services (Pty) Ltd., 2007a, Portugal—Mining—Overview: MBendi Information Services (Pty) Ltd. (Accessed October 2, 2007, at http://www.mbendi.co.za/indy/ming/eu/po/p0005.htm.)

MBendi Information Services (Pty) Ltd., 2007b, Portugal—Oil and gas—Exploration & production: MBendi Information Services (Pty) Ltd. (Accessed October 2, 2007, at http://www.mbendi.co.za/indy/oilg/eu/po/p0005.htm.)

Ober, J.A., 2007, Lithium: U.S. Geological Survey Mineral Commodity Summaries 2007, p. 96-97.

Potter, M.J., 2007, Feldspar: U.S. Geological Survey Mineral Commodity Summaries 2007, p. 58-59.

Primary Metals Inc., 2007, Corporate overview: Primary Metals Inc. (Accessed September 28, 2007, at http://www.primarymetals.ca/s/Corporate.asp.)

Shedd, K.B., 2007, Tungsten: U.S. Geological Survey Mineral Commodity Summaries 2007, p. 178-179.

U.S. Central Intelligence Agency, 2007, Portugal, *in* World factbook 2007: U.S. Central Intelligence Agency. (Accessed October 1, 2007, at https://www.cia.gov/library/publications/the-world-factbook/geos/po.html.)

U.S. Department of State, 2007, Background note—Portugal: U.S. Department of State. (Accessed October 2, 2007, at http://www.state.gov/r/pa/ei/bgn/3208.htm.)

U.S. Energy Information Administration, 2007, Iberian Peninsula: U.S. Energy Information Administration country analysis brief. (Accessed September 27, 2007, at http://www.eia.doe.gov/emeu/cabs/Iberian_Peninsula/Full.html.)

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TABLE 1
PORTUGAL: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006[e]
METALS						
Aluminum, secondary[e]	thousand metric tons	16	18	16	18	18
Arsenic, white[e]		25	25	15	15	15
Beryl, concentrate, gross weight[e]		5	5	5	5	5
Copper, mine output, Cu content		77,227	77,581	95,743	89,541	78,660 [2]
Iron and steel:						
Iron ore and concentrate, manganiferous:[e]						
Gross weight		14,000	14,000	14,000	14,000	14,000
Fe content		10,000	10,000	10,000	10,000	10,000
Metal:						
Pig iron[e]	thousand metric tons	100	100	100	100	100
Steel:						
Crude	do.	894	722	720	725	725
Hot rolled[e]	do.	1,054 [2]	1,000	1,000	800	800
Lead, refined, secondary[e]		4,000	4,000	4,000	3,000	3,000
Manganese, Mn content of iron ore[e]		300	300	300	300	300
Silver, mine output, Ag content	kilograms	19,500	21,800	24,400	23,786 [r]	20,076 [2]
Tin:						
Mine output, Sn content		574	218	220	243 [r]	25 [2]
Metal, primary and secondary		361	--	--	--	--
Tungsten mine output, W content		693	715	746	816	780 [2]
Uranium concentrate, U_3O_8		2	--	--	--	--
Zinc, smelter, primary[e]		3,000	3,000	3,000	2,000	7,505 [2]
INDUSTRIAL MINERALS						
Barite		NA	NA	NA	21	24 [2]
Calcium carbonate[e]		100,000	100,000	100,000	100,000	100,000
Cement, hydraulic	thousand metric tons	9,759	8,567	8,843	9,000 [e]	9,000
Clays:						
Kaolin[3]		148,706	150,000	152,077	164,072 [r]	NA [2]
Refractory		614,453	625,000	504,017	395,820 [r]	NA [2]
Diatomite		400	300	--	--	-- [2]
Feldspar		124,117	126,116	98,262	133,344	129,333 [2]
Gypsum and anhydrite		579,143	419,799	461,212	389,180 [r]	NA [2]
Lime, hydrated and quicklime[e]		20,000	200,000	200,000	200,000	200,000
Lithium minerals, lepidolite		16,325	24,606	28,696	26,185	28,497 [2]
Nitrogen, N content of ammonia		190,300	244,700	243,900	244,000	244,000
Pyrite and pyrrhotite, including cuprous, gross weight[e]		10,000	10,000	10,000	8,000	8,000
Salt, rock		603,959	602,035	661,704	597,945	586,190 [2]
Sand[e]	thousand metric tons	10,953 [2]	10,000	10,000	7,336 [r, 2]	NA [2]
Sodium compounds, n.e.s.:[e, 4]						
Soda ash		150,000	150,000	150,000	150,000	150,000
Sulfate		50,000	50,000	50,000	50,000	50,000
Stone:						
Basalt		500,000	403,233	456,300	464,236	NA [2]
Calcareous:						
Dolomite	thousand metric tons	1,758	1,932	1,900 [e]	1,021 [r]	NA [2]
Limestone, marl, calcite	do.	51,095	48,780	51,355	51,025 [r]	NA [2]
Marble	do.	802	705	749	752 [r]	NA [2]
Gabbro[e]	do.	100	100	100	100	100
Granite:						
Crushed	do.	28,645	30,000	29,665 [r]	30,000 [e]	30,000
Ornamental	do.	900	540	646 [r]	659	NA [2]
Graywacke[e]	do.	1,000	806	428 [2]	344 [r, 2]	NA [2]
Ophite	do.	120	52	52	51 [r]	NA [2]
Quartz[e]	do.	16	16	5 [2]	5	5
Quartzite	do.	455	414	301	256 [r]	NA [2]

See footnotes at end of table.

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TABLE 1—Continued
PORTUGAL: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006[e]
INDUSTRIAL MINERALS—Continued						
Stone--Continued:						
Schist	thousand metric tons	150	173	259	208 [r]	NA [2]
Slate[e]	do.	40	38	36 [2]	33 [r]	NA [2]
Syenite	do.	185	160	116	109 [r]	NA [2]
Sulfur, byproduct, all sources[e]		28,000	27,000	25,000	25,000	25,000
Talc		8,916	5,459	6,231	5,362	5,517 [2]
MINERAL FUELS AND RELATED MATERIALS						
Coke, metallurgical[e]	thousand metric tons	300	300	300	300	300
Gas, manufactured[e]	thousand cubic meters	125	125	125	125	125
Petroleum refinery products:[e]						
Liquefied petroleum gas	thousand 42-gallon barrels	3,869 [2]	4,489 [2]	3,200	3,200	3,200
Gasoline	do.	21,243 [2]	23,469 [2]	20,000	20,000	20,000
Kerosene and jet fuel	do.	4,052 [2]	5,694 [2]	6,500	6,500	6,500
Distillate fuel oil	do.	35,697 [2]	37,084 [2]	30,000	30,000	30,000
Residual fuel oil	do.	18,359 [2]	17,995 [2]	19,000	19,000	19,000
Unspecified	do.	16,206 [2]	16,535 [2]	16,000	16,000	16,000
Refinery fuel and losses	do.	6,278 [2]	6,716 [2]	3,800	3,800	3,800
Total	do.	105,704 [2]	111,982 [2]	98,500	98,500	98,500

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. NA Not available. -- Zero.
[1]Table includes data available through June 2007.
[2]Reported figure.
[3]Includes washed and unwashed kaolin.
[4]Not elsewhere specified.

Source: U.S. Geological Survey Minerals Questionnaire, Portugal, 2005-06.

TABLE 2
PORTUGAL: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Calcium carbonate		Omya Mineral Portuguesa Lda. (Salmon & Cia Lda.)	Mine and plant at Fatima	100
Cement		Cimentos de Portugal S.A. (Cimpor) (Government, 100%)	Plants (3) at Alhandra, Loule, and Souselas	12,000
Copper, concentrate		Primary Metals Corp.	Neves Corvo Mine near Castro Verde	100
Diatomite		Sociedade Anglo-Portugesa de Diatomite Lda.	Mines at Obidos and Rolica	150
Feldspar		A.J. da Fonseca Lda.	Seixigal Quarry, Chaves	10
Ferroalloys		Electrometalúrgia S.A.R.L.	Plant at Setubal	100
Kaolin		Saibrais Arelas e Caulinos S.A. (Denain Anzin Mineraux S.A.)	Mines at Casal dos Bracais and Mosteiros	175
Petroleum, refined	42-gallon barrels per day	Petróleos de Portugal (Petrogal) (Government, 100%)	Refineries at Porto and Sines	305,000
Pyrite		Pirites Alentejanas S.A. (EuroZinc Mining Corp.)	Mine at Aljustrel, plant at Setubal	100
Steel, crude		SN Servicos S.A. (Metalúrgica Galaica S.A., 100%)	Steelworks at Maia and Seixal	600
Do.		Lusosider Aços Planos S.A. (Corus Group, 50%, and Sollac S.A., 50%)	Rolling mill at Seixal	400
Tin		Primary Metals Corp.	Neves Corvo Mine near Castro Verde	15
Tungsten, concentrate	metric tons	Beralt Tin & Wolfram S.A. (Primary Metals Inc.)	Panasqueira Mine and plant at Barroca	1,400
Uranium	do.	Empresa Nacional de Uranio S.A. (Government, 100%)	Mines at Guargia, plant at Urgeirica	150
Zinc, refined		RMC Quimigal S.A.R.L.	Electrolytic plant at Barreiro	12

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THE MINERAL INDUSTRY OF SPAIN

By Alfredo C. Gurmendi

In 2006, Spain was a significant European producer of such mineral commodities as cement (seventh after China, India, the United States, and others), fluorspar (sixth after China, Mexico, Mongolia, and others), gypsum (second after the United States), and industrial sand and gravel (sixth after the United States, Slovenia, Germany, Austria, and France) (Dolley, 2007; Founie, 2007; Miller, 2007; van Oss, 2007).

Spain occupies about 85% of the Iberian Peninsula and has some of the most mineralized territory in Western Europe, including the volcanic-hosted massive sulfide (VMS) deposits of the Iberian Pyrite Belt (IPB) of southern Spain. The IPB stretches from Seville in southern Spain to south of Lisbon in Portugal. The Belt comprises a series of Late Devonian to Mid-Carboniferous age rocks and is dominated by a thick Lower Carboniferous volcanic occurrence referred to as the Volcanic Sedimentary Sequence (VS). The VS is overlain by a southwest-prograding turbiditic sequence which, toward the south, is in turn overlain by a cover of Tertiary and Quaternary alluvial sediments. Within the VS, at least 80 VMS deposits are thought to exist. The IPB alone was estimated to have yielded 1.7 billion metric tons of sulfides. The main polymetallic deposits include the Aznalcollar, the Lomero-Poyatos, the Rio Tinto, the Scotiel, and the Tharsis. In Spain, Cambridge Mineral Resources plc (CMR) owns 100% of its local subsidiary, Recursos Metallicos SA, which holds mining licenses over the Lomero-Poyatos auriferous polymetallic massive sulfide deposit with the right to production. The licenses are valid for 45 years (Cambridge Mineral Resources plc, 2007; Encyclopedia of the Nations, 2007).

Minerals in the National Economy

Spain was the fifth ranked economy in the European Union (EU) and the world's 15th ranked exporting country. The country has a long history of mining and has attracted interest from many major mining companies for gold and base-metal prospecting, exploration, development, and production. International mineral investment has been encouraged by several important factors, including the highly prospective geology of the IPB in the south and the gold discoveries at the Boinas, the Carles, and the El Valle deposits in the Rio Narcea Belt in the north. International mineral investment interest has been encouraged by the country's transparent legislative framework, positive fiscal environment for the extraction of natural resources, well-developed infrastructure and skilled workforce, long mining tradition, track record of successful exploration and mine development, and the availability of nonrefundable Government grants for both exploration and mine development (Cambridge Mineral Resources plc, 2007; Federation of International Trade Associations, 2007).

Spain's economy has become diversified and increasingly service-based since the country joined the EU. Spain's international economic profile has grown appreciably in recent years. The share of foreign trade in Spain's gross domestic product (GDP) was about 55% in 2006. Spain's top three export partners were France, Germany, and Portugal. Its top three import partners were Germany, France, and Italy. The Government moved to decentralize powers to the regions and liberalize the economy by instituting a privatization program, labor market reform, and measures designed to increase competition in selected markets and make the country's economy more market oriented. Spain was fully integrated into European institutions and qualified for the European Monetary Union. These actions helped restore confidence in the Government's macroeconomic management and created conditions for lower inflation and interest rates. Inflation was 3.5% in 2006 compared with 4.1% in 2005. For 2006 as a whole, Spain's real GDP growth was 3.9% compared with 3% in 2005. The mining and mineral processing industries represented almost 1% of the GDP in 2006. Spain had a population of more than 45 million inhabitants in 2006; the total labor force was 19.2 million; of this total, services represented 65.1%; industry, 29.7%; and agriculture, 5.2%. The mineral sector employed 57,000, or about 1% of the industry total of 5.7 million. Despite Spain's strong economic growth, significant risks remained, including the country's continued loss of competitiveness and a decline in EU structural funds and foreign direct investment (Sociedad Estatal de Participaciones Industriales, 2006, p. 33-34; U.S. Central Intelligence Agency, 2007; U.S. Department of State, 2007).

Government Policies and Programs

Minerals are owned by the state under an arrangement known as the Regalía Principal. The Mining Law of July 21, 1973, and the Hydrocarbon Law of October 7, 1998, govern the mineral industry. The Dirección General de Política Energética y Minas implements these mineral laws. Law 20 of June 5, 2006, modified the Finance Regime of the Sociedad Estatal de Participaciones Industriales (SEPI), which is a state-owned holding company with mining as one sector in its portfolio. In the minerals sector, SEPI was concerned mainly with the state-owned companies Hulleras del Norte, S.A. (HUNOSA), which produced coal; Minas de Almadén y Arrayanes, S.A. (MAYASA), which produced mercury; and Enusa Industrias Avanzadas, S.A. (ENUSA), which produced nuclear power. The Instituto Geológico y Minero de España (IGME) is the principal Government mineral-resource agency. IGME offers assistance in the fields of geology and mining to the private and public sectors through the production of maps and scientific publications (Sociedad Estatal de Participaciones Industriales, 2006, p. 26; Federation of International Trade Associations, 2007).

Production

Data on mineral production are provided in table 1. Primary aluminum metal production decreased to 349,000 metric tons (t)

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in 2006 from 394,200 t in 2005. Production of mined copper content increased to 8,700 t from 7,900 t in 2005, and refined copper production decreased to 263,700 t from 284,200 t in 2005. Gold mine production remained at about the same level as that of 2005. Production of lead and mined zinc decreased in the past few years owing to the closures of the Aznalcollar, the Reocin, the Rubiales, the Sotiel, and the Tharsis Mines. Mine production of nickel increased to 6,400 t from 5,380 t in 2005. Quarried mineral products, particularly quarried stone, accounted for a significant share of the mineral production in Spain. Spain was a leading producer of natural sodium sulfate, and slate and strontium minerals, and an important processor of domestic and imported raw materials. In 2006, Spain's domestic energy production consisted of nuclear (56.3%), coal (22.5%), hydropower (7.9%), petroleum (0.5%), natural gas (0.2%), and others (12.6%). Spain's energy consumption sources were nuclear (49.1%), coal (19.5%), hydropower (6.9%), petroleum (0.4%), natural gas (0.2%), and others, including renewable energies (23.9%) (Ministerio de Industria, Turismo y Comercio, 2006, p. 31; 2007, p. 15).

Structure of the Mineral Industry

Table 2 is a list of Spain's leading mineral industry facilities. Spain's accession to the EU in January 1986 required the country to open its economy to trade and investment, modernize its industrial base, improve infrastructure, and revise economic legislation to conform to EU guidelines. Spain followed the U.S.-EU mutual recognition agreements in its application of nontariff regulations and conformity assessments procedures. The mineral industry was made up of a mix of state-owned companies, joint ventures of the state and the private sector, and privately owned companies. In terms of the value of mine output of metallic and nonmetallic minerals and quarry products, Spain was one of the leading EU countries. In 2002, Spain's legislature abolished state and private monopolies, and the Government continued with its program of liberalization in 2006. The liberalization of the electricity and natural gas sectors and the loosening of labor market regulations were accomplished faster than required by the EU. Some of Spain's regional governments, such as Andalusia, Asturias, and Cataluña, have expressed interest in the development of mineral resources in their geographic areas as well (Sociedad Estatal de Participaciones Industriales, 2006, p. 10-11, 26; Encyclopedia of the Nations, 2007).

Commodity Review

Metals

Bauxite and Alumina and Aluminum.—Alumina and primary aluminum were produced almost entirely by Alcoa Inespal S.A. (a subsidiary of Alcoa Inc. of the United States) both for domestic consumption and for export. Alcoa Inespal was a holding company with two primary aluminum plants and three flat-rolled sheet and extrusions plants. Alúmina Española S.A., which was located near San Ciprian, was Alcoa's only European producer of alumina and alumina hydrates.

Copper.—Inmet Mining Corp. of Canada announced that it had completed the acquisition of a 70% interest in Las Cruces copper project, and that a wholly owned subsidiary, Leucadia National Corp., would retain the remaining 30% interest. Las Cruces is a high-grade VMS copper deposit located on the eastern edge of the IPB about 15 kilometers (km) northwest of Seville. The project had estimated proven and probable copper reserves of 17.6 million metric tons (Mt) grading 6.2% copper. The mine had a production capacity of 72,000 metric tons per year (t/yr) of copper cathode, and the projected life of the mine was 15 years (2008 to 2022). All construction and development activities pertaining to Las Cruces mill and open pit mining were expected to be completed by the first part of 2008 (Inmet Mining Corp., 2007).

Ormonde Mining plc of Ireland (a mineral exploration and development company focused on Spain) was seeking to develop mining projects and take them into production. Ormonde's main project was La Zarza copper-gold project in southern Spain where a prefeasibility study for the development of an underground mining operation was completed in September 2006 and a followon bankable feasibility study was being carried out (Ormonde Mining plc, 2007a).

Gold.—CMR's Lomero-Poyatos gold deposit was reported to contain estimated reserves of 3.71 Mt at grades of 3.26 grams per metric ton (g/t) gold, 27.9 g/t silver, 0.87% copper, 1.57% lead, and 1.16% zinc. Ormonde sought to build a mid-size suite of projects in Spain that would be focused primarily on gold. The Salomon project, which was located in northwest Spain, was the most advanced project and contained an estimated 20,000 kilograms (kg) of inferred resources of gold. Ormonde's objective was to establish mining operations that could produce copper, gold, and silver. Projects included the Salamanca, the Salamon, the Tracia, and the Trives gold projects and La Zarza gold-copper project, which was situated within a mining concession in the IPB in southwest Spain. Ormonde was earning a 70% interest in La Zarza gold-copper project by providing €1.8 million ($2.2 million) during a 3-year period under an option agreement with the property owner, Nueva Tharsis S.A.L. La Zarza deposit had been mined formerly for pyrite (iron sulfide only), contained copper, gold, and silver mineralization as well (Cambridge Mineral Resources plc, 2007; Ormonde Mining plc, 2007a, b).

Iron and Steel.—Spain produced 17.8 Mt of crude steel in 2006, which was about the same level as that of 2005. Compañia Española de Laminación S.L. (Celsa) produced about 2.2 million metric tons per year (Mt/yr) of steel in 2006. Celsa produced plain rounds and rebar, wire rod, flat bars, squares, angles, structural sections, and electro-welded mesh. Heat lamination of billets was carried out in three mills, each with its own specifications. One mill produced corrugated round rods and rolls; a second mill produced flat bars, squares, angular and round rods, and light sections; and a third mill produced thick structural sections (Compañia Española de Laminación S.L., 2007). Sidenor Industrial, S.L. (Sidenor), which was a leading producer of special steels in Spain, was planning to start producing stainless steel by expanding its existing electric arc furnace at its works in Basauri, northern Spain. Sidenor was Spain's leading special long-products, forgings, and molded

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parts group as well. A joint venture of Gerdau Group of Brazil, Santander Group of Spain, and executives of Sidenor signed a €443.8 million ($556 million) agreement to acquire the entire capital stock of Sidenor. The investment would allow Gerdau to enter the strategic EU market and provide it with access to large international automobile makers (Sidenor Industrial, S.L., 2007).

Mercury.—Until 2004, MAYASA at Almaden was a leading producer of liquid mercury metal. Almaden is located about 200 km south of Madrid in the Province of Ciudad Real in the Brown Mountain range. Almaden produced about 7.5 million flasks (34.5 kg each), or 258,750 t, of mercury metal. That output was 2.5 times higher than the Idria Mine in Slovenia and 4 times higher than the Monte Amiata Mine in Italy, which were the second and third leading producers of mercury, respectively. In recent years, trade of mercury had decreased because of its alleged toxicity, and mine production was virtually paralyzed. The last available estimate of mercury production was 250 t in 2004 (table 1; Las Minas de Almadén y Arrayanes S.A., 2007).

Nickel.—Rio Narcea Gold Mines Ltd.'s (RNG's) Aguablanca Mine consisted of an open pit, an onsite processing mill, and a potential underground mine. The initial open pit mine life was estimated to be 10.5 years based on the mineral reserves of 15.7 Mt of ore containing 0.66% Ni, 0.46% Cu, 0.47 g/t platinum-group metals (PGM), and 0.13 g/t Au. The assumptions of the feasibility study contemplated an annual production of approximately 8,165 t (18 million pounds) of nickel; 6,350 t (14 million pounds) of copper; and 620 kg (20,000 ounces) of PGM. In early January 2003, Rio Narcea secured an offtake agreement with Glencore International AG of Switzerland for the sale of 100% of the annual concentrate production at the mine until the year 2010. The concentrate would be trucked from Aguablanca to the Ports of Huelva or Sevilla for shipment. The nickel sulfide flotation plant was designed to treat 1.5 Mt/yr of ore with a potential expansion to treat 1.8 Mt/yr. The Aguablanca copper-gold-nickel-PGM deposit in southwestern Spain was defined by more than 45,000 meters (m) of drilling. Formed by three zones of magmatic sulfide mineralization, the deposit occurs in a gabbro-norite intrusive along the north contact of the Santa Olalla granodiorite complex. Pyrrhotite, pentlandite, and chalcopyrite make up the dominant sulfide mineralization (Rio Narcea Gold Mines Ltd., 2007).

Silver.—Spain's silver production remained at about the same level as that of 2005. Ormonde reported that it had entered into an agreement with Polar Mining Oy (a Finnish subsidiary of Dragon Mining NL), which would allow Ormonde to acquire a 50% interest in the Valiña silver project in Lugo Province, northern Spain. Ormonde planned to focus on the potential for an open pit mine with a high-grade resource. Limited previous drilling returned a best interval of 6 m at grades of 451 g/t silver and 1.7 g/t gold, including 1 m at grades of 2,020 g/t silver and 5.8 g/t gold. Anomalous levels of antimony, gold, lead, and silver occur in soil samples for a strike length of 1.1 km. Ormonde's initial work program would entail metallurgical testing designed to investigate the possibility of producing a concentrate containing antimony, gold, and silver for direct sale to a smelter. According to the report of April 24, 2006, La Zarza deposit's ore reserves contained copper (84,900 t), gold (486,100 troy ounces), and silver (6.9 million troy ounces) (Ormonde Mining plc, 2007a).

Tungsten.—Ormonde was evaluating the Barruecopardo high-grade tungsten deposit in the Salamanca area of western Spain, with the objective of assessing the continuity of the high-grade mineralization and to establish if the project would support an underground mining operation that uses a gravity concentration process. Ormonde would also assess the volume, grade, and rate of recovery of the tungsten contained in the dumps and tailings. The Barruecopardo Mine, which closed in the early 1980s, was the largest tungsten mine in Spain that produced a high-quality tungsten concentrate from an open pit operation. It was one of Europe's leading tungsten operations at the time that it was closed. Recent sampling by Ormonde confirmed the presence of gold with the tungsten, and the company planned to evaluate that resource as well (Ormonde Mining plc, 2007a).

Zinc.—Spain's zinc output increased slightly to 502,800 t in 2006 from 501,400 t in 2005. Asturiana de Zinc S.A. continued production at its San Juan de Nieva Castillon plant. Asturiana's core business was the refining and production of zinc metal, mainly zinc ingots. The San Juan de Nieva plant, which had a capacity of 500,000 t/yr of zinc metal was the leading single zinc smelter in the world and was also one of the world's lowest-cost operations (Asturiana de Zinc S.A., 2007).

Industrial Minerals

Barite.—Spain's barite output remained at about the same level as that of 2005. Minerales y Productos Derivados S.A. (Minersa) was a main supplier of drilling-grade material. Minersa continued to operate a surface mine and plant at Vera.

Cement.—Spain's cement output decreased slightly to 50 Mt in 2006 from 50.3 Mt in 2005. Cementos Portland Valderrivas planned to boost its white cement production rate from 700 metric tons per day (t/d) to 900 t/d while achieving a significant emission reduction by converting its El Alto plant near Madrid. The conversion would include the integration of a calciner into the existing preheater, the installation of a new rotary kiln drive, and replacement of the clinker cooler (Polysius AG, 2007).

Clay and Shale.—Spain, whose reserves of sepiolite in the Tagus Basin represent 70% of the world's reserves, maintained its world leadership in sepiolite production. The largest deposit was thought to have reserves in excess of 15 Mt. The Tolsa Group (based in Toledo, Spain) was the discoverer of sepiolite, which is a very light mineral with a very high capacity of absorption; it is used in a variety of products and applications (Grupo Tolsa, 2007).

Fluorspar.—Minersa was Europe's leading fluorspar producer owing to its three deposits in the Province of Asturias in northern Spain. The Emilio, the Jaimina, and the Moscona underground mines produced a combined 420,000 t/yr of crude fluorspar.

Potash.—Iberpotash S.A. was a 100% owned subsidiary of Dead Sea Works Ltd., which was a leading producer of potash and an important potash resource in Western Europe. Iberpotash mined sylvinite and sylvite ore from the Cataluña deposit in the Suria area.

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Mineral Fuels and Other Sources of Energy

Spain has limited energy resources; thus, the country was strongly dependent upon imports of energy. It had no major oilfields; only one natural gas field, which was located offshore; and coal mines that contained mainly low-quality coal. In 2006, proven petroleum reserves were estimated to be 150 million barrels; natural gas reserves, 72 million cubic meters; and coal reserves, 530 Mt. Spain's refinery capacity was almost 1.4 million barrels per day (BP p.l.c., 2007; U.S. Energy Information Administration, 2007).

Spain's production of crude oil and natural gas remained at about the same level as that of 2005. Spain imported about 99% of its crude oil mainly from Russia (15%); Mexico (14.7%); Saudi Arabia (12.7%); and Libya (12.2%). Almost all Spain's natural gas production came from one offshore field, Poseidon, which was operated by Repsol YPF S.A. The country imported 60% of its natural gas from Algeria. Spain was the fifth ranked electricity market in the EU. The country produced 229 billion kilowatts of electricity and consumed 218.4 billion kilowatts. The largest share of electricity generation came from conventional thermal plants (52.3%), hydroelectricity (25.2%), nuclear (14.9%), and other renewables (7.6%). Electricity consumption had grown considerably and was straining the electricity infrastructure; several major blackouts were attributed to supply shortages or transmission grid malfunction (U.S. Energy Information Administration, 2007).

Coal.—Spain's coal production decreased to 18.4 Mt in 2006 from 19.4 Mt in 2005. Coal continues to be Spain's most plentiful indigenous energy source, but its cost of production was high, which made Spanish coal less competitive than that of many other countries. Spain's attempts to modernize and restructure its coal industry caused a decline in total coal production but has not led to decreased production costs. Private companies produced most of the coal in the country, although the leading producer of bituminous coal was Government-owned HUNOSA Group and the leading producer of lignite was Empresa Nacional de Electricidad S.A. (International Energy Agency, 2007; Ministerio de Industria, Turismo y Comercio, 2007, p. 17).

Renewable Energy.—In Europe, Germany and Spain continued to attract the majority of investments in wind power. In 2006, these two countries represented 50% of the EU's wind power growth, and the leading European countries with wind power installations were Germany [2,233 megawatts (MW)], Spain (1,587 MW), France (810 MW), Portugal (694 MW), and the United Kingdom (634 MW) (European Wind Energy Association, 2007).

Outlook

Spain is a significant European producer of such mineral commodities as cement, coal, copper, gold, silver, and zinc. Several gold, nickel, tungsten, and base-metal projects are undergoing feasibility studies and most of them are focused on the IPB. According to the Encyclopedia of the Nations (2007), the IPB is a focus of interest for mining companies and it is a prime target for exploration activities because of past successes in discovering large VMS deposits and possible increased production of copper, gold, nickel, silver, and sepiolite in Spain. Owing to Spain's dependence on imported energy, more attention is likely to be directed toward biofuels, clean coal, and renewable energy investments (López de Sillanes, 2007). The Government is expected to continue with its privatization and liberalization efforts in the mineral industry. More than 80% of Spain's mining production is industrial minerals and rocks, and this is expected to continue. Production of coal could eventually be phased out despite ongoing EU subsidies to maintain it. These subsidies are, however, expected to be eliminated by 2010.

References Cited

Asturiana de Zinc S.A., 2007, Asturiana de Zinc—Informe anual 2006: Asturiana de Zinc S.A. (Accessed October 18, 2007, at http://www.azsa.es.)

BP p.l.c., 2007, BP statistical review of world energy: London, United Kingdom, BP p.l.c., June 27. (Accessed July 16, 2007, via http://www.bp.com/statisticalreview.)

Cambridge Mineral Resources plc, 2007, Spain: London, United Kingdom, Cambridge Mineral Resources plc. (Accessed October 12, 2007, via http://www.cambmin.co.uk/.)

Compañía Española de Laminación, S.L., 2007, Calidad y Servicio, nuestro compromiso: Barcelona, España, Compañía Española de Laminación, S.L. (Accessed October 17, 2007, at http://www.celsa.com/es/zonapublica/empresa.aspx.)

Dolley, T.P., 2007, Sand and gravel (industrial): U.S. Geological Survey Mineral Commodity Summaries 2007, p. 140-141.

Encyclopedia of the Nations, 2007, Spain—Mining: Advameg Inc. (Accessed October 12, 2007, via http://www.nationsencyclopedia.com/.)

European Wind Energy Association, 2007, Statistics: Brussels, Belgium, World Energy Association. (Accessed October 18, 2007, at http://www.ewea.org/.)

Federation of International Trade Associations, 2007, Spain—International trade: Federation of International Trade Associations. (Accessed October 17, 2007, at http://www.fita.org/countries/panorama_17.html.)

Founie, Alan, 2007, Gypsum: U.S. Geological Survey Mineral Commodity Summaries 2007, p. 74-75.

Grupo Tolsa, 2007, Raw materials—Sepiolite: Grupo Tolsa. (Accessed October 18, 2007, via http://www.tolsa.com/esp/index.htm.)

Inmet Mining Corp., 2007, Las Cruces' 2006 highlights and project status: Las Cruces, Spain, Inmet Mining Corp. (Accessed October 17, 2007, via http://www.inmetmining.com/.)

International Energy Agency, 2007, Member country activities—Spain 2006 annual report: IEA Wind. (Accessed October 18, 2007, at http://www.ieawind.org/member_country_activities. html.)

Las Minas de Almadén y Arrayanes S.A., 2007, Las Minas de Almaden: Las Minas de Almadén y Arrayanes S.A. (Accessed October 18, 2007, at http://www.dealmaden.com/lasminas.htm.)

López de Sillanes, J.L., 2007, Annual report 2007: Compañía Logística de Hidrocarburos (CLH Group), 107 p.

Miller, M.M., 2007, Fluorspar: U.S. Geological Survey Mineral Commodity Summaries 2007, p. 60-61.

Ministerio de Industria, Turismo y Comercio, 2006, La Energía en España 2006: Secretaría General de Energía, 221 p.

Ministerio de Industria, Turismo y Comercio, 2007, Secretaría General de Energía: Coyuntura Energética, Boletín Trimestral, no. 49, Primer trimestre 2007, 55 p.

Ormonde Mining plc, 2007a, Background to the La Zarza copper-gold and Barruecopardo tungsten projects: Ormonde Mining plc. (Accessed October 17, 2007, via http://www.ormondemining.com/.)

Ormonde Mining plc, 2007b, Several high-grade silver-gold prospects in Spain: Ormonde Mining plc. (Accessed October 17, 2007, via http://www.ormondemining.com/.)

Polysius AG, 2007, Polysius—White cement plant in Spain: Polysius AG. (Accessed October 18, 2007, at http://www.polysius.com/newsreadarchi.asp.)

Rio Narcea Gold Mines Ltd., 2007, Operates gold and nickel mining in Northern Spain: Industria y Minería (Diciembre), no. 373, 64 p.

Digitized by Google

Sidenor Industrial, S.L., 2007, The Group Gerdau, Santander, and Directors acquired 100% of Sidenor Group: Sidenor Industrial, S.L. (Accessed October 17, 2007, via http://www.sidenor.com/.)
Sociedad Estatal de Participaciones Industriales, 2006, Informe anual 2006: Madrid, España, 181 p. (Also available from http//www.sepi.es/.)
U.S. Central Intelligence Agency, 2007, Spain, *in* World factbook 2007: U.S. Central Intelligence Agency. (Accessed October 18, 2007, at http://www.cia.gov/library/publications/the-world-factbook/geos/sp.html.)
U.S. Department of State, 2007, Spain: U.S. Department of State background note, October. (Accessed October 18, 2007, at http://www.state.gov/r/pa/ei/bgn/2878.htm.)
U.S. Energy Information Administration, 2007, Iberian Peninsula: U.S. Energy Information Administration country analysis brief, July. (Accessed October 18, 2007, at http://www.eia.doe.gov/emeu/cabs/Iberian_ Peninsula/pdf.pdf.)
van Oss, H.G., 2007, Cement: U.S. Geological Survey Mineral Commodity Summaries 2007, p. 40-41.

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TABLE 1
SPAIN: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006[e]
METALS						
Aluminum:						
Alumina[e, 2]		1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Metal:						
Primary		380,100	389,100	397,500	394,200 r	349,000 [3]
Secondary		242,600	245,000	245,000	242,600 r	242,600 [3]
Total		622,700	634,100	642,500	636,800 r	591,600 [3]
Copper:						
Mine output, Cu content		1,248	643	1,448	7,900 r	8,700 [3]
Metal:						
Blister:						
Primary		281,300	290,300 r	224,300	284,200	263,700 [3]
Secondary		16,700	20,000	14,100	10,000	10,000
Total		298,000	310,300 r	238,400	294,200 r	274,000
Refined:						
Primary		271,500	293,000 r	208,241	267,300	255,400 [3]
Secondary		36,700	14,000	35,000	35,000	35,000
Total		308,200	307,000 r	243,241	302,300 r	290,000
Germanium oxide, Ge content[e]	kilograms	5,000	5,000	5,000	5,000	5,000
Gold, mine output, Au content	do.	5,158	5,362	5,248 [4]	5,300 r	5,300 [3]
Iron and steel, metal:						
Pig iron	thousand metric tons	3,978	3,645	4,036 r	4,200	4,200
Ferroalloys, electric furnace	do.	175	175	175	180	180
Steel:						
Crude	do.	16,358	16,287	17,684	17,800	17,800
Hot rolled[e]	do.	15,000	14,000	15,000	15,000	15,000
Lead:						
Mine output, Pb content		6,171	1,765	--	--	--
Metal, secondary		116,000	99,100	105,600	110,000	110,100 [3]
Mercury, mine output, Hg content		727	500	250	--	--
Nickel, Ni content of concentrate		--	--	(4)	5,380	6,400 [5]
Silver, mine output, Ag content	kilograms	3,409	2,246	3,583	3,600	3,600
Tin, mine output, Sn content[e]	do.	267	247 [3]	231 [3]	--	--
Uranium, mine output:						
U content		315	170	170	--	--
U_3O_8 content		372	200	200	--	--
Zinc:						
Mine output, Zn content		69,926	15,100	--	--	--
Metal, primary and secondary		502,400	519,900	525,100 r	501,400	502,800 [3]
INDUSTRIAL MINERALS						
Barite, $BaSO_4$		52,494	44,660	40,776	37,000 e	37,000
Cement, hydraulic	thousand metric tons	42,417	44,747 r	45,593	50,347	50,000 [3]
Clays:						
Attapulgite		22,918	18,975	20,796	20,000 e	20,000
Bentonite		123,457	103,174	156,760	105,000 e	105,000
Kaolin, washed		419,483	450,000	437,990	450,000 e	450,000
Other[e]	thousand metric tons	15,000	15,000	15,000	15,000	15,000
Diatomite and tripoli		53,558	52,700	33,799	34,000 e	34,000
Feldspar		538,407	600,000	552,507	580,000 e	580,000
Fluorspar, CaF_2 content:						
Acid-grade		131,155	129,195	135,505	133,495	139,500 [3]
Metallurgical-grade		10,279	10,503	10,186	10,500	10,500
Total		141,434	139,698	145,691	143,995	150,000
Gypsum and anhydrite, crude	thousand metric tons	11,218	11,500	12,534	13,000 e	11,500

See footnotes at end of table.

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TABLE 1—Continued
SPAIN: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006[e]
INDUSTRIAL MINERALS—Continued						
Lime, hydrated and quicklime[e]	thousand metric tons	1,800	1,800	1,800	1,818 [3]	2,000 [3]
Magnesite, calcined[e]		150,000	150,000	150,000	150,000	150,000
Mica		11,786	11,800	7,825	10,000	10,000
Nitrogen, N content of ammonia	thousand metric tons	415	432	404	400	400
Pigment, mineral:						
Ocher		140,000	174,153	138,050	140,000 [e]	140,000
Red iron oxide[e]		4,500	5,404 [3]	1,734 [3]	1,500	1,500
Potash, K_2O equivalent		481,329	594,355	590,000 [e]	575,000 [e]	580,000
Pumice		701,528	711,898	553,210	600,000 [r]	600,000
Pyrite, plus cuprous, gross weight[e]	thousand metric tons	100	--	--	--	--
Salt:						
Rock, including byproduct from potash works	do.	2,560 [e]	2,563	2,657	3,200 [r]	3,200
Marine and other	do.	1,334	1,400	1,336	1,350 [e]	1,400
Sand and gravel, silica sand[6]	do.	95,768	105,000	113,948	135,000 [e]	135,000
Sepiolite, meerschaum		733,134	690,395	851,647	800,000 [e]	800,000
Sodium compounds, n.e.s.:[e]						
Soda ash, manufactured	thousand metric tons	500	500	500	500	500
Sulfate, natural:						
Glauberite, Na_2SO_4 content		754,945 [3]	815,560 [3]	944,971 [3]	9,500,000	9,500,000
Thenardite, Na_2SO_4 content		160,000	200,000	165,030 [3]	165,000	165,000
Manufactured		125,000	125,000	125,000	125,000	125,000
Stone:						
Chalk[e]	thousand metric tons	876	920	1,063 [3]	1,000	1,000
Dolomite	do.	11,537	12,000	14,489 [r]	15,000 [e]	15,000
Limestone[e]	do.	236,411 [3]	248,000	265,694 [3]	270,000	270,000
Marble, ornamental	do.	5,230	5,000	2,245	2,620	2,600
Marl[e]	do.	10,000	10,000	10,356 [3]	10,000	10,000
Basalt[e]	do.	3,400	3,400	5,094 [3]	5,000	5,000
Granite, ornamental[e]	do.	1,200	1,412 [3]	2,471 [3]	2,500	2,500
Ophite[e]	do.	2,800	2,800	3,874 [3]	4,000	4,000
Phonolite	do.	1,761	2,000 [e]	1,729	1,800 [e]	1,800
Porphyry	do.	1,971	2,100 [e]	1,139	1,100 [e]	1,100
Quartz[e]	do.	2,000	2,000	1,139 [3]	1,100	1,100
Quartzite	do.	2,784	2,900 [e]	2,873	2,800 [e]	2,800
Sandstone	do.	2,246	2,400 [e]	3,608	3,400 [e]	3,400
Slate	do.	828	837	1,429	1,200 [e]	1,200
Other[e]	do.	900	900	900	900	900
Strontium minerals, Sr_2O_4 content		171,293	152,383	192,942	188,000 [e]	188,000
Sulfur, byproduct:[e]						
Metallurgy	thousand metric tons	544	500	500	500	500
Petroleum	do.	140	150	150	115 [r]	100
Coal (lignite) gasification	do.	1	1	1	1	1
Total	do.	685	651	651	616 [r]	601
Talc and steatite[e]		115,000	115,000	107,892 [3]	100,000	100,000
MINERAL FUELS AND RELATED MATERIALS						
Coal, marketable:						
Anthracite	thousand metric tons	9,752 [r]	9,386 [r]	8,923 [r]	8,553 [r]	8,354 [3]
Bituminous	do.	3,557 [r]	3,181 [r]	3,426 [r]	3,214 [r]	3,223 [3]
Lignite	do.	8,726 [r]	7,981 [r]	8,147 [r]	7,587	6,822 [3]
Total	do.	22,035 [r]	20,548 [r]	20,496 [r]	19,354 [r]	18,399 [3]
Coke, metallurgical	do.	2,628	2,500	2,500	2,500	2,500
Gas, natural, marketed	thousand cubic meters	553,156	550,000 [e]	370,019	330,000 [e]	330,000

See footnotes at end of table.

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TABLE 1—Continued
SPAIN: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006[e]
MINERAL FUELS AND RELATED MATERIALS—Continued						
Peat[e]		55,302 [3]	55,000	57,229 [3]	60,000	60,000
Petroleum:						
Crude	thousand 42-gallon barrels	2,427	2,404	1,913	1,261	1,300
Refinery products:						
Liquefied petroleum gas	do.	35,164	33,234	33,072	33,698	33,700
Naphtha[e]	do.	26,069 [3]	25,000	25,000	25,000	25,000
Gasoline, motor	do.	74,035	76,431	87,797	87,593	87,600
Jet fuel	do.	28,944	24,456	21,688	21,224	21,200
Kerosene	do.	15,965	15,942	16,000	16,000 [e]	16,000
Distillate fuel oil	do.	149,759	111,676	112,000	112,000 [e]	112,000
Residual fuel oil	do.	68,085	60,353	55,730	57,294	57,300
Other	do.	80,483	79,461	80,000 [e]	80,000 [e]	80,000
Refinery fuel and losses	do.	25,146	27,631	26,000	26,000 [e]	26,000
Total	do.	503,650	454,184	457,000 [e]	459,000 [e]	459,000

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. -- Zero.

[1]Table includes data available through March 2007. Source: Ministerio de Industria, Turismo y Comercio—Secretaría General de Energía, 2007.

[2]Reflects aluminum hydrate.

[3]Reported figure.

[4]The Aguablanca operation of Rio Narcea Gold Mines Ltd. was commissioned in December 2004.

[5]Reported by World Metal Statistics, May 2007.

[6]Includes sand obtained as a byproduct of feldspar and kaolin production.

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TABLE 2
SPAIN: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities	Annual capacity
Alumina		Alúmina Española S.A. (Alcoa Inc.)	Alumina plant at San Ciprian, Lugo	1,000
Aluminum		do.	Electrolytic plant at San Ciprian, Lugo	230
Do.		Alcoa Inespal S.A. (Alcoa Inc.)	Electrolytic plant at Aviles	85
Do.		do.	Electrolytic plant at La Coruña	85
Barite		Minerales y Productos Derivados S.A. (Minersa)	Mine and plant at Vera, Almeria	100
Bentonite		Süd-Cheme España SL	Mine and plant at Yuncos, Toledo	150
Cement		Of which:	Including:	44,000
Do.		Ashland S.A.	Puerto de Sagunton, Valencia	2,000
Do.		do.	Villaluenga de la Sagra, Toledo	2,000
Do.		do.	3 other plants	2,000
Do.		35 other companies	49 other plants	38,000
Coal:				
Anthracite		Antracitas Gaiztarro S.A.	Mines at Maria and Paulina	2,000
Do.		do.	Mines near Oviedo	2,000
Do.		Antracitas del Bierzo S.A.	Mines near Leon	1,000
Bituminous		Hulleras del Norte S.A. (Hunosa)	Various mines and plant	3,300
Do.		Hulleras Vasco Leonesa S.A.	Santa Lucia Mine, Leon	2,000
Do.		Minas de Figaredo S.A.	Mines near Oviedo	1,000
Do.		Nacional de Carbon del Sur (Encasur)	Rampa 3 and San Jose Mines, Cordoba	200
Lignite		Empresa Nacional de Electricidad S.A. (Endesa)	As Pontes Mine, and Andorra Mine, La Coroña	15,000
Copper:				
Metal		Atlantic Copper S.A. (Freeport MacMoRan Copper & Gold Inc., 100%)	Refinery at Huelva	270
Do.		do.	Electrolytic refinery at Huelva	105
Do.		Industrias Reunidas de Cobre	Smelter at Asua-Bilbao	30
Do.		Elmet SL	Smelter and electrolytic refinery at Berango, Vizcaya	60
Ore, metal		Atlantic Copper S.A. (Freeport MacMoRan Copper & Gold Inc., 100%)	Mines and plant at Arientero near Santiago de Compostela	12
Do.		do.	Alfredo underground mine in Rio Tinto area	30
Do.		Minas de Rio Tinto S.A.	Cero Colorado open pit mine	20
Dunite		Pasek España S.A.	Mines and plant at Landoy, Ortigueira	1,500
Fluorspar, ore		Minerales y Productos Derivados S.A. (Minersa)	Plant at Torre, Asturias	150
Do.		do.	Underground mines at Emilio, Jaimina, and Moscona, Asturias	420
Gold	kilograms	Rio Narcea Gold Mines, Ltd.	El Valle and Carles Mines, Asturias	3,750
Lead:				
Metal		Española del Zinc S.A.	Refinery at Cartagena, Murcia	50
Do.		Compañia La Cruz, Minas y Fundaciones de Plomo S.A.	Smelter at Lineares, Jaen	40
Do.		do.	Refinery at Lineares, Jaen	40
Do.		Tudor S.A.	Secondary smelter at Saragoza	16
Do		Ferroaleaciones Españolas, S.A.	Secondary smelter at Medina del Campo	12
Do		Derivados de Minerales y Metales	Secondary smelter at Barcelona	5
Ore		Sociedad Minera y Metalúrgica de Peñarroya de España S.A. (Peñarroya, France, 90%)	Opencast mine at Montos de Los Azules	25
Do.		Andaluza de Piritas S.A.	Mine at Aznalcollar (closed 2001)	21
Do.		Exploración Minera International España S.A. (EXMINESA)	Underground mine at Rubiales, Lugo	16
Magnesite		Magnesitas Navarras S.A.	Mine at Eugui, plant at Zubiri	600
Do.		Magnesitas de Rubián S.A.	Plant at Monte Castel	70
Mercury	thousand flasks	Minas de Almadén y Arrayanes S.A. (Government, 100%)	Mines and smelter at Almaden	7,500
Nickel, metal		Rio Narcea Gold Mines Ltd.	Aguablanca Mine, Extremadura	8

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TABLE 2—Continued
SPAIN: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities	Annual capacity
Petroleum:				
Crude	42-gallon barrels per day	Chevron S.A.	Oilfield at Casablanca	300
Refined	do.	Repsol YPF S.A.	Refinery at Escombreras	200,000
Do.	do.	do.	Refinery at Puertollano	14,000
Do.	do.	do.	Refinery at Tarragona	260,000
Do.	do.	Refineria de Petróleos del Norte S.A. (Petronor)	Refinery at Somorrostro	240,000
Do.	do.	Compañía Española de Petróleos S.A. (Cepsa)	Refinery at Santa Cruz de Tenerife	160,000
Do.	do.	Petroleos del Mediterraneo S.A. (Petromed)	Refinery at Castellon de la Plana	120,000
Do.	do.	Compañía Iberica Refinadora de Petróleos S.A. (Petroliber)	Refinery at La Coruña	140,000
Potash, ore		Iberpotash S.A. (Dead Sea Works Ltd.)	Mines and plants at Suria near Barcelona	850
Pyrite		Compañia Española de Mines de Tharsis	Mines and plants at Tharsis and Zarza (closed)	1,300
Do.		do.	Plant at Huelva	600
Do.		Rio Tinto Minera S.A. (Rio Tinto plc, 75%, and Rio Tinto Zinc, 25%)	Mines and plant at Rio Tinto (closed 2001)	900
Sepiolite		The Tolsa Group	Mine and plant at Vicalvaro near Madrid	100
Do.		Silicatos-Anglo-Ingleses S.A.	Mine and plant at Villecas near Madrid	200
Sodium sulfate		Crimidesa S.A.	Mine and plant at Cerezo de Rio, Burgos	600
Steel		Aceralia Corporación Siderúrgica (Arbed S.A., 35%)	Plants at Aviles, Gijon, Sagunto, and Sestao	8,000
Do.		Compañia Española de Laminación S.L (Celsa Group, 100%)	Plant at Barcelona	2,600
Do.		Sidenor Industrial, S.L. (Sidenor) (Gerdau Group, 50%, and Santander Group, 50%)	Plant at Basauri	2,500
Strontium		Solvay Minerales S.A.	Mines and plant at Escuzar, Granada	85
Do.		Bruno S.A.	Mine and plant at Montevives, Granada	50
Uranium, U_3O_8	metric tons	Empresa Nacional del Uranio (Enusa) (Government, 100%)	Mines and plant near Ciudad Real	500
Zinc:				
Metal		Asturiana de Zinc S.A. (Xstrata plc, 100%)	Electrolytic zinc plant at San Juan de Nieva Castillon	500
Do.		Española del Zinc S.A.	Electrolytic plant at Cartagena	50
Ore		Asturiana de Zinc S.A. (Xstrata plc, 100%)	Reocin mines and plants (closed 2003)	500
Do.		Exploración Minera International España S.A. (EXMINESA)	Underground mine at Rubiales, Lugo	500
Do.		Sociedad Minera y Metalúrgica de Penarroya-Espana S.A.	Mines and plants at Montos de los Azules y Sierra de Lujar, San Agustin	200

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The Mineral Industry of Sweden

By Harold R. Newman

Geologically, Sweden can be divided into principal areas, each of which has its own distinctive characteristics concerning mineral prospectivity. Southern Sweden, south of a line running from Gothenburg to Stockholm, contains few known mineral occurrences, although the region was considered to have excellent potential for industrial and construction minerals. The main metal-mining activity has been north of this line; historically, the principal mining centers have been the Bergslagen, the Norrbotten, and the Skellefte districts.

Minerals in the National Economy

Mining and metals production continued to be of economic importance to the country and contributed about 29% of the gross domestic product. Sweden was one of the leading ore- and metal-producing countries in the European Union (EU). The output of the mineral and manufacturing industries enabled Sweden to become a leading exporting country in the EU.

The total value of exported goods in 2006 was $173,639 million, of which minerals contributed $29,216 million. Significant mineral commodity exports included iron and steel (valued at $9,875 million), petroleum products ($9,417 million), nonferrous metals ($3,585 million), and iron ore and concentrates ($1,590 million). The total value of imported goods was $149,548 million, of which minerals contributed $14,574 million. Significant mineral commodity imports included iron and steel (valued at $6,295 million), nonferrous metals ($3,756 million), and metalliferous ores ($2,321 million). Imports of mineral fuels included petroleum ($10,452 million) and petroleum products ($5,245 million).

Production

Sweden has a variety of mineral resources and was a leading mineral commodity producer in the EU; the country produced and exploited base metals, gold, industrial minerals, and silver, and produced metals and manufactured metal products. Sweden was a leading producer of iron ore in the EU, producing about 1% of the world's total. Owing to its lack of mineral fuels, the country depended on imports of crude oil to produce petroleum products for its domestic needs. In addition, the country has abundant hydropower and timber.

Sweden is a major trading country and the amount of mineral commodities produced depends mainly on demand for these commodities. The grade of the material, ongoing renovation, and sublevel stop development also can affect the amount of material produced.

Structure of the Mineral Industry

The Swedish mineral industry was composed mostly of privately owned companies and operated on a free market basis. The Government was the major owner of the iron ore operations and held equity in the steel operations. The structure of the mineral industry is described in table 2, including the major facilities, their production capacities, and the mineral commodities produced.

Commodity Review

Metals

Copper.—Boliden AB announced that it would invest about $720 million to expand operations at the Aitik Mine at Gallivare. The investment would involve building a new concentrator that would double ore production to 36 million metric tons per year (Mt/yr) by 2010 from 18 Mt/yr in 2006. The new investment would make it possible for Boliden to mine about 60% of Aitik's total mineral reserves and extend the mine life by 10 years (InfoMine, 2006).

Gold.—Beowulf Mining plc's Grundtrask project is located near the town of Mala in the Skellefta mining district and comprises three licenses that cover an area of 43 square kilometers (km^2). A gold-bearing structure that runs for a strike length of 750 meters (m) and is up to 27-m wide has been associated through diamond drilling and is open at both ends and at depth. The gold is associated with arsenopyrite and chalcopyrite in quartz veins and stock works in altered pre-Cambrian basic volcanic rocks. The structure at the focus of the drilling in 2006 was one of five structures planned for exploration (Beowulf Mining plc, 2006a).

Iron and Steel.—Luossavaara-Kiirunavaara AB (LKAB) announced that work was continuing on the concentrating and pelletizing plant at Kiruna. The main part of the ground work and the laying of cable was completed for the concentrator. For the pelletizing plant, the main part of the ground construction was finished but some work on the connecting roads remained to be done. The new plants were scheduled to be operational by mid-2008 (Luossavaara-Kiirunavaara AB, 2006a).

LKAB announced that construction of the new pelletizing plant at Malmbergerbet was ahead of schedule. The three parts of the project—expansion of the concentrating plant, construction of a new pelletizing plant, and construction of a new installation for loading and unloading at the switchyard—were being completed. The plant was expected to be fully operational by yearend 2007 (Luossavaara-Kiirunavaara AB, 2006b).

Nickel.—Mawson Resources Ltd. announced that it had signed a letter of agreement to form a joint-venture with Independence Group NL of Australia for the Storbodsund nickel sulfide project, which is located in the Arvidsjar district of northern Sweden. Historical drilling at Storbodsund intersected high-grade nickel sulfide mineralization. The mineralization consists of a flat sheet of semimassive sulfide lying 10 to 15 m below the surface and is composed of pentlandite and pyrrhotite and lesser amounts of chalcopyrite. Disseminated nickel

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mineralization has also been mapped in an outcrop north of the Storbodsund project (CNX Marketlink, 2006).

Titanium.—Beowulf Mining announced that it had been granted an exploration permit for the Ruoutevare area, which covers a large ore deposit of iron and titanium. The mineralization consists of ilmenite, magnetite, spinel, and smaller amounts of chalcopyrite, pentlandite and pyrrhotite. Reserves were estimated to be 116 million metric tons (Mt) at an average grade of 38.2% iron, 5.6% titanium, and 0.17% vanadium. An additional section of 20 Mt was registered with a grade of 47% iron, 11% titanium oxide, and 0.15% vanadium pentoxide. Beowulf was obtaining bulk samples to work with LKAB to see if iron and titanium metallurgical separation could be obtained economically (Beowulf Mining Ltd., 2006b).

Mineral Fuels and Related Materials

Uranium. —The Nordic Council of Ministers announced that although permission had been granted for surveys in the Swedish mountains, it did not mean that uranium mining would be allowed. The Government's decision to close down its nuclear powerplants would be incompatible with a policy that allowed uranium mining (Nordic Council of Ministers, 2006).

Outlook

Mining has been very significant to Sweden's economy in the past and this situation is expected to continue. The global role of Sweden as an iron ore producer may increase dramatically. Within 5 to 10 years, iron ore production could reach 50 Mt/yr, which is about double that of today. Sweden has substantial basemetal, gold, and iron ore deposits, which will continue to be actively exploited and developed. Foreign companies are likely to continue to explore actively in Sweden for base metals, diamond, and gold. The quantity of profitable ores in existing mines will likely be increased by effective and successful exploration in the vicinity of the mines.

References Cited

Beowulf Mining plc, 2006a, Gold exploration in northern Sweden: Stockholm, Sweden, Beowulf Mining plc, November 22. (Accessed January 25, 2007, at http://www.beowulfmining.com/comp/compPresentation.php.)

Beowulf Mining plc, 2006b, Granting of licence over titanium deposit in northern Sweden: Stockholm, Sweden, Beowulf Mining plc, March 27. (Accessed March 28, 2006, at http://www.beowulfmining.com/announce/pressrelease27mar.html.)

CNX Marketlink, 2006, Mawson joint ventures out Storbodsund nickel - copper - cobalt project in Sweden to Independence Group NL: Toronto, Ontario, Canada, CNX Marketlink, February 1. (Accessed February 6, 2006, at http://www.cnxmarketlink.com/en/releases/archive/February2006/01/c3033.)

InfoMine, 2006, Mine investment, Gallivare: Stockholm, Sweden, Boliden AB, October 31. (Accessed January 25, 2007, at http://www.infomine.com/news/headline/welcome.asp?NewsID=63063.)

Luossavaara-Kiirunavaara AB, 2006a, New concentrating and pelletizing plant in Kiruna: Kiruna, Sweden, Luossavaara-Kiirunavaara AB, June 22. (Accessed January 25, 2007, at http://www.lkab.com/skrivut?openform&id=8BEE.)

Luossavaara-Kiirunavaara AB, 2006b, New pelletizing plant in Malmberget: Malmberget, Sweden, Luossavaara-Kiirunavaara AB, June 22. (Accessed January 25, 2007, at http://www.lkab.com/skrivut?openform&id=8BF6.)

Nordic Council of Ministers, 2006, No uranium mining in Sweden: Copenhagen, Denmark, Nordic Council of Ministers, February 28. (Accessed August 4, 2008, at http://www.norden.org/webb/news/news.asp?id=5978&lang=6.)

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TABLE 1
SWEDEN: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006[e]
METALS						
Aluminum, metal:						
Primary		100,600	101,200	101,400	102,567 [r]	101,180 [2]
Secondary[e]		28,000	30,000	29,000	30,000	32,000
Total		128,600	131,200	130,400	132,567 [r]	133,180 [2]
Copper:						
Mine output, Cu content		76,200	96,000	90,600	97,800	86,700
Metal:[e]						
Smelter:						
Primary		188,000	185,000	206,000	192,000	194,200 [2]
Secondary		35,000	30,000	30,000	55,000 [r]	54,000
Total		223,000	215,000	236,000	247,000 [r]	248,200 [2]
Refined:						
Primary		199,000	189,000	235,620 [r]	223,482 [r]	229,241 [2]
Secondary		25,000	25,000	25,000	22,000	25,000
Total		224,000	214,000	260,620 [r]	245,482 [r]	254,241 [2]
Gold:						
Mine output, Au content	kilograms	4,500	4,300	5,200	6,600 [r]	4,500
Metal, primary[e, 3]	do.	8,000	8,000	8,000	8,000	8,000
Iron and steel, metal:						
Iron ore concentrate and pellets:[e]						
Gross weight	thousand metric tons	20,300	21,500	22,300	23,300	24,000
Fe content	do.	13,400	14,100	14,700	15,300	16,000
Metal:						
Pig iron and sponge iron	do.	3,703	3,710	3,871	3,500 [e]	3,500
Ferroalloys:						
Ferrochromium		118,823	110,529	128,191	127,451	136,374 [2]
Ferrosilicon[e]		21,500 [r]	17,100 [r]	18,500 [r]	9,800 [r]	4,000
Total[e]		140,000 [r]	128,000 [r]	147,000 [r]	137,000 [r]	140,374 [2]
Steel, crude	thousand metric tons	5,754	5,707	5,949	5,692	5,435 [2]
Semimanufactures[e]	do.	4,695	4,600	4,700	4,700	4,500
Lead:						
Mine output, Pb content		43,000	51,000	54,300	60,400 [r]	55,600
Metal, refined:[e]						
Primary		30,000	24,200	21,500 [r]	32,800 [r]	25,400
Secondary		39,700	52,000	52,000	46,100 [r, 2]	39,800 [2]
Total		69,700	76,200	73,500 [r]	78,900 [r, 2]	65,200 [2]
Molybdenum, oxide, roasted, Mo content[e]		3,000	3,000	3,000	3,000	3,000
Nickel, metal, secondary[e]		50	50	50	50	50
Selenium, elemental, refined[e]		20	20	20	20	20
Silver:						
Mine output, Ag content	kilograms	293,900	319,600 [r]	319,600 [r]	309,900 [r]	292,000 [2]
Metal, primary[e, 3]	do.	250,000	250,000	250,000	250,000	250,000
Zinc, mine output, Zn content		148,600	185,900	197,000	215,670 [r]	208,551 [2]
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand metric tons	2,642 [r]	2,476 [r]	2,588 [r]	2,600 [e]	2,600
Diamond, synthetic[e]	thousand carats	20,000	20,000	20,000	20,000	20,000
Feldspar, salable, crude and ground[e]		40,000	41,000	42,000	43,000	43,000
Fertilizer, manufactured:[e]						
Nitrogenous	thousand metric tons	400	400	400	400	400
Phosphatic	do.	10	10	10	10	10
Mixed	do.	300	300	300	300	300
Graphite[e]		900	850	800	800	800
Lime[e]	thousand metric tons	580	590	590	600	600
Quartz and quartzite[e]	do.	600	600	700	700	700

See footnotes at end of table.

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TABLE I—Continued
SWEDEN: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006[r]
INDUSTRIAL MINERALS—Continued						
Stone:[e]						
Dimension:						
Mostly unfinished	thousand metric tons	160	170	160	170	170
Granite	do.	130	130	130	132	132
Limestone	do.	30	32	32	32	32
Slate	do.	15	15	15	16	16
Other	do.	6	6	6	6	6
Crushed:						
Dolomite	do.	450	440	430	450	450
Granite	do.	3,500	3,500	3,500	3,500	3,500
Limestone:						
Chalk	do.	70	80	80	80	80
For cement manufacture	do.	4,000	3,950	3,900	4,000	4,000
For lime manufacture	do.	900	950	950	950	950
For other construction and industrial uses	do.	1,700	1,700	1,700	1,800	1,800
For agricultural uses	do.	600	650	600	650	650
For other uses	do.	1,500	1,500	1,500	1,500	1,500
Total	do.	8,770	8,830	8,730	8,980	8,980
Sandstone	do.	10	15	20	20	20
Undifferentiated	do.	30,000	30,000	30,000	30,000	30,000
Other	do.	400	400	350	350	350
Sulfur:						
Metallurgy	do.	170 [e]	235	235	240	240
Petroleum	do.	60 [e]	57	59	60	60
Total	do.	230 [e]	292	294	300	300
Talc, soapstone[e]		15,000	15,000	14,000	14,000	14,000
MINERAL FUELS AND RELATED MATERIALS						
Coke, metallurgical[e]	thousand metric tons	1,200	1,250	1,300	1,400	1,400
Gas, manufactured:[e]						
Coke oven gas	million cubic meters	500	500	500	500	500
Blast furnace gas	do.	3,500	3,500	3,500	3,500	3,500
Peat:						
Agricultural use[e]	thousand cubic meters	1,800	1,800	1,100	1,200	1,716 [2]
Fuel	do.	2,885	2,633	1,866	1,900	3,041 [2]
Petroleum, refinery products:[e]						
Liquefied petroleum gas	thousand 42-gallon barrels	3,000	3,000	3,000	4,000	4,000
Naphtha	do.	500	500	500	500	500
Gasoline, motor	do.	40,000	41,000	41,000	41,000	41,000
Jet fuel	do.	1,500	1,600	1,600	1,600	1,600
Kerosene	do.	50	50	50	50	50
Distillate fuel oil	do.	58,000	58,000	59,000	60,000	60,000
Residual fuel oil	do.	40,000	40,000	41,000	41,000	41,000
Other	do.	7,800	8,000	8,000	8,000	8,000
Refinery fuel and losses	do.	5,000	5,000	5,000	5,000	5,000
Total	do.	156,000	157,000	159,000	161,000	161,000

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised.
[1]Table includes data available through September 13, 2007.
[2]Reported figure.
[3]Includes only that recovered from indigenous ores, excluding scrap.

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TABLE 2
SWEDEN: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum		Granges AB (Glencore International AG, 100%)	Sundsvall smelter at Kubikenborg	100
Cement		Cementa AB (Scancem, 100%)	Plants at Degerhamn, Skovde, and Slite	3,400
Copper:				
Ore, copper content		Boliden Mineral AB	Mines at Aitik, Garpenberg, Kankberg, Kristineberg, Langdal, Petiknas, and Renstrom	68
Do.		Outokumpu Oyj	Mines at Pahtohavare	22
Metal		Boliden Metals AB	Smelter and refinery at Ronnskar	240
Feldspar		Berglings Malm & Mineral AB (Omya GmbH)	Mines at Beckegruvan, Hojderna, and Limbergsbo	50
Do.		Forshammar Mineral AB (Omya GmbH)	Mines at Limberget and Riddarhyttan	30
Do.		Larsbo Kalk AB (Omya GmbH)	Mines at Glanshamar and Larsbo	20
Ferroalloys		Vargon Alloys AB	Plant at Vargon	175
Gold:				
Ore, gold content	kilograms	International Gold Exploration AB, 50%, and Dormant Properties AB, 50%	Bjorkdal Mine at Skellefte	3,000
Do.	do.	Boliden Mineral AB	Mines at Aitik, Akerberg, Kankberg, Kristineberg, Langdal, Petiknas, and Renstrom	2,000
Metal	do.	do.	Smelter and refinery at Ronnskar	17,000
Graphite		Woxna Graphite AB (Tricorona Mineral AB, 100%)	Mine and plant at Kringeltjarn, Woxna	20
Iron and steel		Svenskt Stal AB (Government, 48%)	Steelworks at Borlange, Lulea, and Oxelosund	3,900
Iron ore		Luossavaara-Kiirunavaara AB (Government, 98%)	Mines at Kiruna and Malmberget	32,500
Kyanite		Svenska Kyanite AB (Svenska Mineral AB, 100%)	Quarry at Halskoberg	10
Lead:				
Ore, lead content		Boliden Mineral AB	Mines at Garpenberg, Laisvall, Langdal, Petiknas, and Renstrom	110
Do.		North Mining Svenska AB	Zinkgruvan Mine at Ammeberg	20
Metal		Boliden Metals AB	Smelter and refinery at Ronnskar	115
Lime		Euroc Mineral AB	Plants at Limham, Koping, and Storugns	250
Do.		Svenska Mineral AB	Plants at Rattvik and Boda	250
Limestone		Kalproduction Storugns AB (Nordkalk AB, 100%)	Mines at Gotland Island	3,000
Marble	cubic meters	Borghamnsten AB	Quarry at Askersund	15,000
Petroleum, refined	42-gallon barrels per day	Skandinaviska Raffinaderi AB	Refinery at Lysekil	210,000
Do.		BP Raffinaderi AB	Refinery at Gothenburg	100,000
Do.		Shell Raffinaderi AB	do.	82,000
Do.		AB Nynas Petroleum	Refineries at Gothenburg, Malmo, and Nynashamn	54,000
Silver, metal	kilograms	Boliden Metals AB	Smelter and refinery at Ronnskar	408,000
Do.	do.	North Mining Svenska AB	Zinkgruvan Mine at Ammeberg	25,000
Zinc, ore, zinc content		Boliden Mineral AB	Mines at Garpenberg, Laisvall, Langdal, and Renstrom	112
Do.		Zinkgruvan Mining AB (North Ltd., 100%)	Zinkgruvan Mine at Ammeberg	60

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The Mineral Industry of Switzerland

By Harold R. Newman

The mineral assets of Switzerland are limited. The reserves of the small deposits of metalliferous ores that once existed in Switzerland have been depleted. Consequently, metals were not mined in 2006. Metal processing in 2006 was confined mainly to the production of primary and secondary aluminum, copper, secondary lead, pig iron, and steel. Mining was mostly related to mineral commodities required for construction. Industrial minerals produced by mining and processing included cement, clays, gravel, gypsum, and lime (table 1).

Trade has been the key to prosperity in Switzerland. The country was dependent upon export markets to generate income and upon imports for raw materials. The value of 1 metric ton of exported goods was two and a quarter times more than that of the same amount of imports. Switzerland's main trading partner was Germany, followed by France, Italy, and the United Kingdom (Swissworld, 2006).

Production

At the end of April 2006, Alcan Inc. of Canada announced the closure of its 44,000-metric-ton-per-year (t/yr) primary aluminum smelter at Steg and cessation of anode production at Sierre. Alcan stated that, with the expiration of its long-term energy contracts, the rise in energy costs had made the production of primary aluminum economically unsustainable and would result in significant financial losses (Alcan Inc., 2006).

Novelis Inc. of the United States announced that it would invest $32 million to build a new casthouse at its Sierre rolling mill. The facility would house a multialloy casting center. The 70,000-t/yr unit was expected to be operational in early 2008. The center would cast multiple alloys into aluminum ingots using Novelis Fusion technology. The technology produces a metallurgical bond between the alloy layers and permits alloy combinations that were not possible before in aluminum rolling. The multialloy ingots are rolled into high-performance aluminum sheets, which would be targeted for sale domestically and for export to the automotive industry. Novelis produces its aluminum from recycled aluminum beverage cans and aluminum scrap (Azom, 2006).

The country served as a major diamond exchange; it was actively involved in the cutting and polishing of diamond and played a significant role in international diamond trade activities. Lucerne was the world's third most important diamond trading center after London and Antwerp. In 2006, Switzerland's exports of polished diamond were valued at $661 million and imports of polished diamond were valued at $592 million (HRD—Antwerp World Diamond Center, 2006).

Atel AG planned to build a 55-megawatt gas-fired powerplant in Monthey, Valais, to supply electricity and steam to three chemical companies: Ciba SC, Huntsman AG, and Syngenta AG. The plant would supply electricity and industrial process hot steam. The plant was expected to come onstream in mid-2008 (Aare-Tessin Ltd., 2006).

Structure of the Mineral Industry

The Swiss mineral industry was mostly privately owned. Regulatory control was administered by the Government (table 2). More-extensive coverage of the mineral industry of Switzerland can be found in the 2005 Minerals Yearbook, volume III, Area reports—International—Europe and Central Eurasia, which is available on the World Wide Web at http://minerals.usgs.gov/minerals/pubs/country.

References Cited

Aare-Tessin Ltd., 2006, Electricity and steam for industry in the Canton of Valais (Switzerland): Aare-Tessin Ltd. (Accessed August 14, 2007, at http://www.atel.eu/en/group/news/?news=tcm:61-18031&page=2&adhoc=No&fromday=1&frommonth=1&fromyear=2005&today=2007.)

Alcan Inc., 2006, Smelting operation unsustainable at current energy rates: Alcan Inc. (Accessed August 20, 2007, at http://www.alcan.com/web/publishing.nsf.)

Azom, 2006, Novelis to invest $32 million to install breakthrough casting technology in Europe: Azom. (Accessed August 13, 2007, at http://www.azom.com/details.asp?newsID=6579.)

HRD—Antwerp World Diamond Center, 2006, HRD annual report 2006: HRD—Antwerp World Diamond Center. (Accessed August 14, 2007, at http://www.hrd.be/uploads/media/Annual_Report2006_full.pdf.)

Swissworld, 2006, Dependence on trade: Swissworld. (Accessed August 13, 2007, at http://www.swissworld.org/en/economy/the_swiss_economy/dependence_on_trade.)

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TABLE 1
SWITZERLAND: ESTIMATED PRODUCTION OF MINERAL COMMODITIES[1,2]

(Thousand metric tons unless otherwise specified)

Commodity[3]		2002	2003	2004	2005	2006
METALS						
Aluminum:						
Primary	metric tons	40,007 [4]	43,538 [4]	44,538 [4]	44,800 [r]	12,000
Secondary	do.	181,400 [4]	186,930 [4]	192,000	193,200 [r,4]	190,000
Iron and steel, metal:						
Pig iron		100	100	100	100	100
Crude steel		1,100	1,100	1,200	1,158 [4]	1,200
Semimanufactures		700	700	700	700	700
Lead, refined, secondary	metric tons	8,000	8,000	9,000	8,000	9,000
INDUSTRIAL MINERALS						
Cement, hydraulic		3,771 [4]	3,613 [r,4]	3,851 [r,4]	4,022 [r,4]	4,000
Gypsum		300	300	300	300	300
Lime		60	75	75	75	75
Nitrogen, N content of ammonia		33 [4]	29 [4]	32 [4]	30	30
Salt		434 [4]	562 [4]	569 [4]	566 [r,4]	560
Sulfur, from petroleum refining	metric tons	3,000	3,000	3,000	3,000	3,000
MINERAL FUELS AND RELATED MATERIALS						
Petroleum refinery products:						
Liquefied petroleum gas	thousand 42-gallon barrels	2,446 [4]	3,640 [4]	3,500	3,500	3,500
Gasoline	do.	9,928 [4]	9,089 [4]	10,000	10,000	10,000
Distillate fuel oil	do.	15,002 [4]	14,126 [4]	14,000	14,000	14,000
Residual fuel oil	do.	4,782 [4]	4,891 [4]	5,000	5,000	5,000
Bitumen	do.	800	800	800	800	800
Refinery fuel and losses	do.	1,862 [4]	1,716 [4]	1,800	1,800	1,800
Total[5]	do.	34,820 [4]	34,262 [4]	35,100	35,100	35,100

[r]Revised.
[1]Estimated data are rounded to no more than three significant digits.
[2]Table includes data available through April 2007.
[3]In addition to the commodities listed, a variety of crude construction materials (common clay, sand and gravel, and stone) were produced, but output was not reported, and available general information was inadequate to make reliable estimates of output.
[4]Reported figure.
[5]Total of listed products only.

TABLE 2
SWITZERLAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum		Novelis Inc. (Hindalco Industries Ltd., 100%)	Plant at Sierre	168
Cement		Holcim (Schweitz) AG (Holcim Group, 100%)	Plants (7) at various locations	4,300
Do.		Cementfabrik Holcim AG (Holcim Group, 100%)	Plant at Rekingen	700
Copper	metric tons	Schmelzmetall AG	Refinery at Gurtnellen	2,400
Gold	kilograms	Produits Artistiques de Métaux Précieux S.A. (MKS Finance SA, 100%)	Refinery at Castel San Pietro	425,000
Lead, secondary		Metallum AG	Smelter at Pratteln	13
Petroleum, refinery	barrels per day	Tamoil (Suisse) S.A. (Colony Capital LLC, 65%, and Government of Libya, 35%)	Refinery at Collombey	72,000
Do.	do.	Petroplus Refining Cressier S.A. (The Carlyle Group)	Refinery at Cressier	68,000
Salt		Saline de Bex S.A. (Canton of Vaud, 100%)	Saline plant at Bex	50
Steel		Stahl Gerlafingen AG (Swiss Steel AG, 100%)	Plant at Gerlafingen	650
Do.		von Moss Stahl AG (Swiss Steel AG, 100%)	Plant at Emmenbrucke	300

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THE MINERAL INDUSTRY OF THE UNITED KINGDOM

By Walter G. Steblez[1]

The United Kingdom was a major European and world economy whose gross domestic product (GDP) in 2006 was ranked second after Germany in the European Union (EU). The output value of the United Kingdom's industry accounted for about 26% of the GDP. The country was a major regional processor of mineral raw materials and a manufacturer of producer and consumer durables. The country's heavy industries, which included companies that produced automotive and aviation products, chemicals, and machine tools, relied heavily on imported metal ores and concentrates, as well as on some industrial minerals and mineral fuels. The production of mineral fuels, which included coal, natural gas, and petroleum, formed a significant segment of the United Kingdom's mineral industry. The country also accounted for about 4% of world refined lead production, about 3% of refined nickel and crude salt output, about 2% of potash production, and more than 1% of the world's output of aluminum and crude steel (Bray, 2007, p. 5.17; Ober, 2007, p. 58.9; U.S. Central Intelligence Agency, 2007, p. 598; Carlin, Smith, and Bi, 2008, p. 42.20-42.21; Fenton, 2008, p. 37.13-37.14; Kostick, 2008, p. 63.15-63.17).

Minerals in the National Economy

The value of mineral production, according to the latest available data (2005), amounted to about $57 billion,[2] which was about 3% of the United Kingdom's GDP. Fossil fuels (coal, gas, and oil) amounted to about 91% of the total value of mineral production. Aggregates, construction materials, and industrial minerals constituted about 9% of the total value of mineral production; and metals, an insignificant portion (Hetherington and others, 2007, p. 1).

The United Kingdom's mineral sector not only served domestic economic needs but its mining and processing companies continued to play an important role in global mineral prospecting, mineral development, and mineral commodity trade. The London Metal Exchange remained the dominant world central market for nonferrous metals and the authority on nonferrous metal futures.

Government Policies and Programs

The 1971 Minerals Act, as amended, was the statute that governed the development and working of mineral deposits. Minerals, as defined in Section 209 of the Act, include all minerals and materials in or under the land of a kind ordinarily worked for removal by underground or surface workings; it does not, however, include peat cut for purposes other than for sale. Mineral development is specifically addressed in the Town and Country Planning (Minerals) Regulations, 1971 and the Town and Country Planning (Minerals) Act, 1981. Mineral rights to mineral fuels, such as coal, petroleum, and uranium, belong to the state. The Coal Authority is authorized to license open pit and underground mines to the private sector subject to restrictions on their size and the payment of a royalty on the amount of coal produced.

Most other mineral rights in Great Britain are privately owned with the exceptions of gold and silver, which are vested in the Royal Family. A different situation regarding mineral rights applies to Northern Ireland where, under the Mineral Development Act (Northern Ireland), 1969, the rights to work minerals and to license others to do so are vested in the state. Although the Government had ratified the Kyoto Protocol, the EU decided to meet Kyoto requirements as a whole, rather than as individual signatories, with each member state given a different emissions target by the EU.

Production

In 2006, the United Kingdom's production of coal, natural gas, and crude oil continued to decline. Since 1999, the annual output of coal has dropped by about 47% and crude oil, by about 38%. Natural gas output has declined by 23% since 2002.

Production of metals displayed mixed results compared with respective output levels in 2005. Minor production gains were posted for primary lead and secondary lead and for crude steel. Minor production declines were noted in primary and secondary aluminum output and refined nickel production, and potash production also continued to decline (table 1).

Structure of the Mineral Industry

Domestic and internationally owned corporations produced minerals and mineral-based commodities. Table 2 is a list of major mineral industry facilities.

Mineral Trade

Metals trade balances in 2005 (the latest year for which data were available) were mixed. Metal ores and scrap and nonferrous metals registered negative trade balances of about $917 million and $377 million, respectively. Positive trade balances of about $1.2 billion, $1.1 billion, and $43.4 million were recorded for iron and steel, nonmonetary gold, and metal manufactures, respectively. Trade in coal, petroleum (including petroleum products), and natural gas recorded negative trade balances of $3.5 billion, $1.3 billion, and $800 million, respectively. The overall trade in minerals and mineral-based products amounted to about a negative $4.5 billion (Hetherington and others, 2007, p. 5).

[1]Deceased.

[2]Where necessary, values have been converted from the British pound sterling (£) to U.S. dollars (US$) at the average rate of £1.84=US$1.00 and from the European euro (€) to U.S. dollars (US$) at the average rate of €0.796=US$1.00 for 2006.

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Commodity Review

Metals

Aluminum.—British Alcan Aluminium Ltd. operated two primary aluminum smelters in the United Kingdom. The nation's third smelter was operated by Anglesey Aluminium Metal Ltd. All the aluminum smelters depended on imported alumina for feedstock. There were several small secondary smelters, which in 2006 accounted for about 35% of the United Kingdom's total aluminum production (table 1).

Copper and Nickel.—Although the United Kingdom did not mine nickel or mine or produce copper, Alba Mineral Resources plc (Alba) continued to study the Arthrath copper-nickel–platinum-group-metal (PGM) project in Aberdeenshire, Scotland. At midyear, Alba reported having reached a joint-venture and exploration option agreement with Inco Ltd. of Canada. The agreement gave Inco the right to earn a 60% interest in the Arthrath project in return for a capitalization of $3.14 million for exploration during a 4-year period. Alba reported that extensive disseminated magmatic nickel-copper sulfide mineralization was present on the Arthrath prospect (Alba Mineral Resources plc, 2006).

Gold.—Falkland Gold and Minerals Ltd. (FGML) continued to explore for gold in the overseas territory of the Falkland Islands. By October 2006, FGML had drilled about one-half of its planned 23 targets. Earlier indications showed subeconomic resources of gold and PGM (Falkland Gold and Minerals Ltd., 2006, p. 1).

In Northern Ireland, Tournigan Gold Corp. of Canada continued exploration for gold at Curraghinalt, and Galantas Gold Corp. continued the development of the Omagh gold mine in County Tyrone. Galantas was building Northern Ireland's first gold mine. Trial runs of ore through the concentrate plant started in December 2006. Initial commercial production was scheduled for early 2007 (Galantas Gold Corp., 2007).

Iron and Steel.—In 2006, steel output in the United Kingdom increased by 5.5% compared with that of 2005 (table 1). Major issues pertaining to the steel industry during the year involved new investments and possible ownership changes at Corus Group plc, which was the dominant producer of steel in the United Kingdom. In April, Corus announced plans to invest $73.6 million in the modernization of two slab casters at the company's Teesside cast-product facility. An auction deadline for acquiring Corus set by The Panel on Takeovers and Mergers, which was an independent financial organization that regulated commercial company mergers and takeovers in the United Kingdom, was January 30, 2007. In late 2006, Tata Steel of India submitted a bid of about $8 billion for Corus. Companhia Siderugica Nacional of Brazil also expressed interest in acquiring Corus (Minerals UK, 2006a; b).

Industrial Minerals

The United Kingdom remained an important producer of such minerals as barite, calcareous material for cement, clays, and fluorspar.

Barite.—Locally produced barite continued to be a major component in the drilling mud used by petroleum drilling companies that operated in the North Sea. The major producer of barite was M-I Drilling Fluids (UK) Ltd., which operated the underground Foss Mine near Aberfeldy in Perthshire, Scotland. Barite production in England has increasingly become a byproduct of fluorspar mining in the Southern Pennine Orefield (British Geological Survey, 2006a).

Cement.—Raw materials for cement produced in the United Kingdom included chalk, clays, limestone, and mudstone. Cement-manufacturing companies included Lafarge Cement UK, Ltd., Castle Cement Ltd., CEMEX UK Operations, Ltd., and Buxton Lime Industries Ltd., which had total clinker capacities of 6.0 million metric tons per year (Mt/yr), 3.6 Mt/yr, 2.8 Mt/yr, and 800,000 metric tons per year (t/yr), respectively. In 2006, cement production in the United Kingdom amounted to about 11.4 million metric tons (Mt), which was an increase of about 1.6% compared with that of 2005 (table 1; British Geological Survey, 2005, p. 14).

Clay and Shale.—In 2006, the Imerys Group, which was a leading producer of kaolin (china clay) in the world, announced plans to reorganize its operations, which would involve ceasing the production of paper coating clay owing to its high energy cost. The company reported that it would focus production on lower-grade (and lower-cost) filler clays, but would continue to produce high-grade clays for ceramics and chemical and rubber products (Imerys S.A., 2006).

Fluorspar.—Glebe Mines Ltd. was the only domestic producer of fluorspar (calcium fluorite) and supplied the two United Kingdom fluorochemical producers with acid-grade fluorspar. Glebe's operations were based on surface extraction and processing in the Southern Pennine Orefield. Glebe operated the Cavendish Mill near Stoney Middleton for the supply of acid-grade fluorspar, together with byproduct barite and lead concentrate. Reserves of fluorite were estimated to be about 1 Mt, which would be sufficient for mill requirements for the next 10 years at current production levels (British Geological Survey, 2006b).

Mineral Fuels

Coal.—UK Coal plc, which was the leading coal mining company in England, operated five underground and seven open pit coal mines in 2006. Scottish Coal Company Ltd., which operated 12 surface mines, was the leading coal producer in Scotland. Of the 17 licenses for underground mining in the United Kingdom, 7 were held by UK Coal. The 41 surface mines in the United Kingdom were mined by 16 operators. Scottish Coal held the largest number of surface mine licenses, with 14. More than 50 Mt/yr of coal was used to fuel about 41% of the country's electricity-generating plants, which made coal the leading fuel source used for power generation.

Natural Gas and Petroleum.—The North Sea holds Europe's largest natural gas and petroleum reserves. As of January 2006, the United Kingdom's estimated proven crude oil reserves totaled 4.0 billion barrels, which was the largest within the EU; the reserves were located mostly offshore on the United Kingdom Continental Shelf. Most of the country's

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production has come from basins east of Scotland in the central North Sea. The northern North Sea, east of the Shetland Islands, also contains considerable reserves, and smaller deposits are located in the North Atlantic Ocean. Besides these offshore assets, the country had the Wytch Farm field, which was the largest onshore oilfield in Europe. Production of petroleum and natural gas in 2006 declined by about 10% and 9%, respectively, compared with that of 2005 (table 1; U.S. Energy Information Administration, 2006).

Outlook

The United Kingdom will continue to be a major European and global processor and fabricator of crude mineral products. Onshore exploration activities will be directed mainly toward gold and mixed sulfide ores. Offshore natural gas and petroleum exploration and site development will continue to be focused in the North Sea, particularly in the areas west of the Shetland Islands, the central North Sea, and the Southern Gas Basin of the North Sea.

References Cited

Alba Mineral Resources plc, 2006, Alba options Arthrath nickel-copper-PGE project to Inco: London, United Kingdom, Alba Mineral Resources plc press release, May 15, 2 p.

Bray, E.L., 2007, Aluminum, *in* Metals and minerals: U.S. Geological Survey Minerals Yearbook 2006, v. I, p. 5.1-5.17. (Accessed May 15, 2008, at http://minerals.usgs.gov/minerals/pubs/commodity/aluminum/myb1-2006-alumi.pdf.)

British Geological Survey, 2005, Cement raw materials: Keyworth, Nottingham, United Kingdom, British Geological Survey mineral profile, November, 20 p.

British Geological Survey, 2006a, Barytes: Keyworth, Nottingham, United Kingdom, British Geological Survey mineral profile, January, 5 p.

British Geological Survey, 2006b, Fluorspar: Keyworth, Nottingham, United Kingdom, British Geological Survey mineral profile, January, 7 p.

Carlin, J.F., Smith, G.R., and Bi, Xiaoyu, 2008, Lead, *in* Metals and minerals: U.S. Geological Survey Minerals Yearbook 2006, v. I, p. 42.1-42.21. (Accessed May 15, 2008, at http://minerals.usgs.gov/minerals/pubs/commodity/lead/myb1-2006-lead.pdf.)

Falkland Gold and Minerals Ltd., 2006, Audited preliminary results for the year ended 30 September 2006: London, United Kingdom, Falkland Gold and Minerals Ltd., December 5, 10 p.

Fenton, M.D., 2008, Iron and steel, *in* Metals and minerals: U.S. Geological Survey Minerals Yearbook 2006, v. I, p. 37.1-37.14. (Accessed May 15, 2008, at http://minerals.usgs.gov/minerals/pubs/commodity/iron_&_steel/myb1-2006-feste.pdf.)

Galantas Gold Corp., 2007, First gold concentrate from Galantas production trial: Toronto, Ontario, Canada, Galantas Gold Corp. press release, January 8, 2 p.

Hetherington, L.E., Brown, T.J., Lusty, P.A.J., Hitchen, K. and Colman, T.B., 2007, United Kingdom Minerals Yearbook 2006: Keyworth, Nottingham, United Kingdom, British Geological Survey, May, 102 p.

Imerys S.A., 2006, Imerys announces reorganization of its UK kaolin operations: Paris, France, Imerys S.A. press release, July 4, 1 p.

Kostick, D.S., 2008, Salt, *in* Metals and minerals: U.S. Geological Survey Minerals Yearbook 2006, v. I, p. 63.1-63.17. (Accessed May 15, 2008, at http://minerals.usgs.gov/minerals/pubs/commodity/salt/myb1-2006-salt.pdf.)

Minerals UK, 2006a, Tata takes over Corus: Keyworth, Nottingham, United Kingdom, British Geological Survey, October, 3 p.

Minerals UK, 2006b, The battle for control of Corus continues: Keyworth, United Kingdom, British Geological Survey, December, 2 p.

Ober, J.A., 2007, Potash, *in* Metals and minerals: U.S. Geological Survey Minerals Yearbook 2006, v. I, p. 58.1-58.9. (Accessed May 15, 2008, at http://minerals.usgs.gov/minerals/pubs/commodity/potash/myb1-2006-potas.pdf.)

U.S. Central Intelligence Agency, 2007, United Kingdom, *in* World Factbook 2007: U.S. Central Intelligence Agency, 699 p.

U.S. Energy Information Administration, 2006, United Kingdom: U.S. Energy Information Administration country analysis brief, May, 13 p. (Accessed August 3, 2006, at http://www.eia.doe.go/emeu/cabs/United_Kingdom/Oil.html.)

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TABLE I

UNITED KINGDOM: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2002	2003[e]	2004[e]	2005[e]	2006[e]
METALS						
Aluminum:						
Alumina from imported bauxite		73,800	-- [r]	-- [r]	-- [r]	--
Metal:						
Primary		344,318	342,748 [2]	359,631 [2]	368,477 [2]	360,300 [2]
Secondary		204,900	205,400 [2]	205,400 [2]	205,301 [2]	197,900 [2]
Total		549,218	548,148 [2]	565,031 [2]	573,778 [2]	558,200
Cadmium, metal, including secondary		292	22 [2]	--	--	--
Iron and steel:						
Iron ore and concentrate, manganiferous:						
Gross weight		464	500	500	354 [r]	350
Fe content, 54% Fe		255	275	275	195 [r]	195
Metal:						
Pig iron	thousand metric tons	8,560 [r]	10,228 [2]	10,180 [2]	10,236 [r]	899 [2]
Steel:						
Crude	do.	11,718	12,900	13,766 [2]	13,210 [2]	13,931 [2]
Hot-rolled	do.	10,876 [r, 2]	10,396 [r, 2]	11,528 [r, 2]	10,299 [r, 2]	10,500
Lead:						
Mine output, Pb content[e]		700	700	500	500	500
Metal:						
Smelter:						
Bullion from imported concentrate		36,000	9,000	36,000	36,000	35,000
Refined:						
Primary[3]		207,719	196,000 [r]	125,938 [r, 2]	161,350 [r]	163,700 [2]
Secondary[4]		166,927	169,574	120,000 [r]	143,000 [r]	144,000 [2]
Total		374,646	365,574	245,938	304,350 [r]	307,700 [2]
Nickel, metal, refined[5]		33,790	26,788	38,606	37,600 [r]	36,800 [2]
Zinc, metal, smelter		99,600	99,600 [r]	16,600 [r]	--	--
INDUSTRIAL MINERALS						
Barite[e, 6]		59,000	57,000	61,000 [r]	62,000 [r]	60,000
Bromine[e]		24,500	25,000	--	--	--
Cement, hydraulic	thousand metric tons	11,089	11,215	11,405	11,216	11,400 [2]
Clays:[e]						
Fire clay	do.	491	528	402	395	400
Fuller's earth[7]	do.	33	19	115	--	--
Kaolin, china clay[8]	do.	2,163	2,097	1,995	1,911 [r]	1,900
Ball clay and pottery clay[7]	do.	921	885	965	1,011	1,000
Other, including shale	do.	10,306	10,680	11,164	10,898	11,000
Feldspar, china stone		1,896	2,865	2,274	1,835	2,000
Fluorspar, all grades[e, 9]		53,000	56,000	50,080	60,980	60,000
Gypsum and anhydrite[e]	thousand metric tons	1,700	1,700	1,686	1,700	1,700
Lime, hydrated and quicklime[e]	do.	1,500	1,500	1,500	1,500	1,500
Nitrogen, N content of ammonia	do.	837	1,044	1,071	1,080	1,100
Potash, KCL product		900,000	1,040,000	912,000	732,000	700,000
Salt:[e]						
Rock	thousand metric tons	1,500	1,700	2,000	2,000	2,000
From brine	do.	1,000	1,000	1,000	1,000	1,000
In brine, sold or used as such	do.	3,200	3,200	2,800	2,800	2,800
Sand and gravel:						
Common sand and gravel	do.	94,424	91,211	97,333	94,666	95,000
Sodium compounds, carbonate, n.e.s.[e, 10]	do.	1,000	1,000	1,000	1,000	1,000

See footnotes at end of table.

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TABLE 1—Continued

UNITED KINGDOM: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2002	2003[e]	2004[e]	2005	2006
INDUSTRIAL MINERALS—Continued						
Stone:						
Calcite[e]	thousand metric tons	10	10	10	10	10
Chalk	do.	8,587	8,066	7,997	7,105	7,000
Dolomite	do.	12,947	12,167	12,226	11,514	11,500
Igneous rock	do.	51,225	51,356	53,037	53,104	53,000
Limestone	do.	80,688	78,935	81,648	77,596	80,000
Sandstone	do.	18,362	18,259	18,844	18,685	18,500
Slate, including fill	do.	742	832	901	928	900
Total	do.	172,561 r	170,000	175,000	169,000	171,000
Sulfur, byproduct:						
Talc, soapstone, pyrophyllite		6,194	6,494	3,881	6,000	6,000
Titanium, titanium dioxide	thousand metric tons	200	200	200	200	200
MINERAL FUELS AND RELATED MATERIALS						
Coal, anthracite and bituminous:	thousand metric tons	29,989	28,279	25,096	20,498	20,000
Coke:						
Metallurgical	do.	4,335	4,286 [2]	4,038	4,105	4,000
Breeze, all types	do.	224	315 [2]	298	259	250
Gas, natural, marketable[11]	billion cubic meters	104 r	103 r	96 r	88 r	80 [2]
Peat[e]	cubic meters	973 [2]	2,008	1,262	1,505	1,500
Petroleum:						
Crude[12]	thousand 42-gallon barrels	810,158	733,763	715,304	660,285 r	597,140 [2]
Refinery products	thousand metric tons	83,996	84,529	89,828	86,003	85,000

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [p]Preliminary. [r]Revised. -- Zero.

[1]Table includes data available through November 2007.

[2]Reported figure.

[3]Produced entirely from imported bullion and includes the lead content of alloys.

[4]Includes a small quantity of primary lead from domestic concentrate.

[5]Refined nickel.

[6]Includes witherite.

[7]Salable product.

[8]Sales, dry weight.

[9]Proportions of grades not available; probably about two-thirds acid grade.

[10]Not elsewhere specified.

[11]Methane, excluding gas flared or reinjected.

[12]Excludes gases and condensates.

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TABLE 2
UNITED KINGDOM: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities[1]	Annual capacity
Aluminum:			
Primary	British Alcan Aluminium Ltd.	Lynemouth Smelter, Northumberland County, England	169
Do.	do.	Lochaber Smelter, Fort William County, Scotland	41
Do.	Anglesey Aluminium Metal Ltd. (Rio Tinto Corp., 51%, and Kaiser Aluminum and Chemical Corp., 49%)	Holyhead, Gwynedd County, Wales	144
Secondary	Hydro Aluminium Deeside Ltd. (Hydro Aluminium AS)	Wrexham, Clwyd County, Wales	55
Do.	Cohen Alloys Ltd.	Glasgow, Scotland	NA
Do.	Coleshill Aluminium Ltd.	Coleshill, Warwickshire, England	NA
Do.	Dolgarrog Aluminium Ltd.	Dolgarrog, Conwy, Gwynedd County, Wales	9
Barite	M-I Drilling Fluids (UK) Ltd.	Foss Mine, near Aberfeldy, Perthshire County, Scotland	50
Do.	Glebe Mines Ltd.	Arthurton West, Bow Rake, High Rake, and Watersaw Mines, Southern Pennine Orefield, Derbyshire County, England	15
Celestite	Bristol Minerals Co. Ltd.	Yate, Avon County, England	30
Cement	Lafarge Cement UK, Ltd. (Lafarge Group)	Aberthaw plant, East Aberthaw, Barry, South Glamorgan County, Wales	500
Do.	do.	Barnstone plant, near Langar, Nottinghamshire County, England	--[2]
Do.	do.	Cauldon plant, near Leek, Staffordshire County, England	1,000
Do.	do.	Cookstown plant, Cookstown, County Tyrone, Northern Ireland	500
Do.	do.	Dunbar plant, Dunbar, East Lothian, Scotland	1,000
Do.	do.	Hope plant, Hope Valley, Derbyshire County, England	1,300
Do.	do.	Northfleet plant, Northfleet, Kent County, England	1,000
Do.	do.	Westburyplant Westbury, Wiltshire County, England	700
Do.	Castle Cement Ltd. (Heidelberg Cement AG, 100%)	Ketton plant, Rutland County, near Stamford, Lincolnshire County, England	1,400
Do.	do.	Padeswood plant, Mold, Flintshire County, Wales	1,400
Do.	do.	Ribblesdale plant, Clitheroe, Lancashire County, England	1,400
Do.	CEMEX UK Operations, Ltd. (CEMEX, S.A.B. de C.V., 100%)	Rugby plant, Rugby, Warwickshire County, England	1,800
Do.	do.	Barrington plant, Barrington, Cambridgeshire County, England	300
Do.	do.	South Ferriby plant, North Lincolnshire County, England	800
Do.	Buxton Lime Industries Ltd.	Tunstead plant, Buxton, Derbyshire County, England	800
Clay:			
Ball clay	WBB Minerals (S.C.R.-Sibelco NV)	Various operations in northern and southern Devon County, England	500
Do.	Imerys Group	Operations in Bovey and Wareham Basins, Dorset County, England	300
China clay (kaolin)	do.	Mines and plants in Cornwall and Devon Counties, England	3,000
Do.	WBB Minerals (S.C.R.-Sibelco NV)	Mines and plants in Cornwall County, England	1,000

See footnotes at end of table.

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TABLE 2—Continued
UNITED KINGDOM: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities[1]	Annual capacity
Coal				
Underground mines		UK Coal plc	Operations in England include the Daw Mill Colliery, Warwickshire County; the Kellingley Colliery, North Yorkshire County; the Maltby Colliery, Rotherham, Yorkshire County; the Thoresby Colliery, Nottinghamshire County; the Welbeck Colliery, Nottinghamshire County	30,000
Do.		Goitre Tower Colliery Ltd.	Tower Colliery, Hirwaun, Mid Glamorgan County, Wales	500
Surface pits		Scottish Coal Company Ltd.	Operations in Scotland include the Broken Cross pit near Douglas, South Lanarkshire County; Chalmerston pit, Dalmellington, East Ayrshire County; Chapelhill, South Lanarkshire County; Glentaggart pit, near Douglas, South Lanarkshire; Newbigging Farm pit, near Howgate, Midlothian County; Powharnal pit, near Muirkirk, East Ayrshire County, St. Ninians (Greenbank) pit, northeast of Dunfermline, Fife	4,000
Do.		ATH Resources PLC	Operations in Scotland include the Grievehill, the Laigh Glenmuir, and the Skares road pits in Ayrshire County; Glenmuckloch pit, Dumfries and Galloway County	1,600
Do.		Celtic Energy Ltd.	Margam pit, near Bridgend, Mid Glamorgan County, Wales	350
Do.		do.	Nant Helen Extension pit, Abercraf, West Glamorgan Wales	400
Do.		do.	Selar pit, Glynneath, West Glamorgan, Wales	400
Do.		Energybuild Ltd.	Nant-y-Mynydd pit, Neath, West Glamorgan, Wales	130
Do.		H.J. Banks Mining (Banks Group)	Dehli pit, Stannington, Northumberland County, England	NA
Fluorspar		Glebe Mines Ltd.	Mill at Stoney Middleton, mines in Derbyshire County, England	60
Gold	kilograms	Galantas Gold Corp.	Omagh Mine, near Omagh, County Tyrone, Northern Ireland	900 [3]
Gypsum		British Gypsum Ltd.	Several mines and quarries in England, which include the Barrow Mine, Barrow upon Soar, southeast of Loughborough, Leicestershire County; the Brightling Mine, Robertsbridge, East Sussex County; the Birkshead Mine, Kirby Thore, near Penrith, Cumbria County; the Fauld Mine, Tutbury, near Burton on Trent, Staffordshire County; the Kilvington Quarry, Staunton in the Vale, Kilvington, Nottinghamshire County; the Marbleegis Mine, East Leake, northeast of Loughborough, Leicestershire County; the Newbiggin Mine, Newbiggin, near Kirby Thore, Cumbria County	3,500
Lead:				
Primary		Britania Refined Metals Ltd. (Xstrata plc)	Northfleet, Kent County, England	180
Secondary		Britannia Recycling Ltd. (Xstrata plc)	Wakefield, West Yorkshire County, England	20
Do.		H.J. Enthoven Ltd. (Quexco Inc, 100%)	Darley Dale, Derbyshire County, England	75
Natural gas	billion cubic meters per year	Numerous domestic and international oil companies	North Sea gasfields	100

See footnotes at end of table.

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TABLE 2—Continued
UNITED KINGDOM: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities[1]	Annual capacity
Nickel, refined		INCO Europe Ltd. (CVRD INCO Ltd.)	Clydach Refinery, near Swansea, West Glamorgan County, Wales	30
Nitrogen, N content of ammonia		Terra Nitrogen Ltd.	Billingham, Durham County, England and Severnside, near Bristol, Avon County, England	550
Do.		GrowHow UK Ltd. (Kemira GroHow Oyj)	Ince, Lancashire County, England	400
Petroleum:				
Crude	million 42-gallon barrels per day	Numerous domestic and international oil companies, which include Apache North Sea Ltd., BG Group, BHP Billiton Ltd., BP p.l.c., Challenger Minerals Inc., Chevron Ltd., ConocoPhillips Ltd., Dana Petroleum plc, Eni Ltd., Exxon Mobil Corp., Hess Corp., Lundin Britain Ltd., Maersk Oil UK Ltd., Marathon Oil U.K. Ltd., Midmar Energy Onshore Ltd., Nexen Petroleum Inc., Noble Energy (Europe) Ltd., Oilexco Inc., Perenco UK Ltd., Petro-Canada UK Ltd., Premier Oil plc, Royal Dutch Shell plc, Statoil (U.K.) Ltd.,Talisman Ltd., Total S.A., and Tullow Oil (U.K.) Ltd.	North Sea oilfields	2
Refined	million 42-gallon barrels	Exxon Mobil Corp.	Fawley refinery, Southampton, Hampshire County, England	120
Do.	do.	Royal Dutch Shell plc	Stanlow manufacturing complex, Ellesmere Port, Cheshire County, England	100
Do.	do.	ConocoPhillips Ltd.	Humber refinery, South Killingholme, North Lincolnshire County, England	90
Do.	do.	Total S.A,	Lindsey refinery, Killingholme, North Lincolnshire County, England	85
Do.	do.	Chevron Ltd.	Pembroke refinery, Pembroke, Dyfed County, Wales	82
Do.	do.	Ineos Group	Grangemouth refinery, Grangemouth, Stirling County, Scotland	80
Do.	do.	BP p.l.c.	Coryton refinery, Stanford-le-Hope, Essex County, England	80
Do.	do.	Petroplus Holdings AG	Teesside refinery, Middlesborough, Cleveland County, England	43
Do.	do.	Total S.A., 70%, and Murco Petroleum Ltd., 30%	Milford Haven, Dyfed County, Wales	40
Do.	do.	Eastham Refinery Ltd. (Shell UK Ltd., 50%, and AB Nynas Ltd., 50%)	Eastham refinery, Ellesmere Port, Cheshire County, England	9
Do.	do.	AB Nynas Ltd.	Dundee refinery, Dundee, Scotland	4
Platinum-group metals		Johnson Matthey plc	Refineries at Enfield (London) and Royston, Hertfordshire County, England	NA
Do.		CVRD Inco Ltd.	Acton refinery, London, England	NA
Potash		Cleveland Potash Ltd. (Israel Chemicals Ltd., 100%)	Boulby Mine, Yorkshire County, England	1,000
Salt:				
Road		do.	do.	600
Rock		British Salt Ltd.	Middlewich, Cheshire County, England	800
Do.		Irish Salt Mining and Exploration Co. Ltd.	Kilroot Mine, Carrick Fergus, Northern Ireland	500
Sand and gravel		Hanson plc	Various offshore and onshore locations	NA
Silica sand		WBB Minerals (S.C.R.-Sibelco NV)	Various operations in Cheshire, Humberside, and Norfolk Counties, England	5,000
Do.		Hanson plc	Various locations	NA

See footnotes at end of table.

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TABLE 2—Continued
UNITED KINGDOM: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities[1]	Annual capacity
Slate, natural	Alfred McAlpine Slate Ltd. (Welsh Slate)	Operations in Wales include the Penrhyn quarry, Bethesda, Conwy County; the Pen Yr Orsedd quarry, Nantlle, Gwynedd County; quarries at Blaenau Ffestiniog and Cwt y Bugail, Gwynedd County	1,000
Do.	Greaves Welsh Slate Company Ltd.	Llechwedd Slate Mines, Blaenau Ffestiniog, Gwynedd County, Wales	NA
Soda ash	Brunner Mond Group (Tata Chemicals Ltd.)	Northwich, Cheshire County, England	900
Steel	Corus Construction & Industrial (Corus Group plc)	Scunthorpe Works, Scunthorte, Lincolnshire County, England	4,500
Do.	Corus Teesside Cast Products (Corus Group plc)	Teesside Works, Redcar, Cleveland County, England	3,900
Do.	Corus Strip Products UK (Corus Group plc)	Port Talbot works, Port Talbot, West Glamorgan, Wales	3,750
Do.	Corus Engineering Steels (Corus Group plc)	Rotherham Works, Rotherham, South Yorkshire County, England	1,200
Do.	do.	Stocksbridge Works near Sheffield, South Yorkshire County, England	NA [4]
Do.	Corus Special Profiles (Corus Group plc)	Skinningrove, Carlin How, near Saltburn-by-the-Sea, Cleveland County, England	NA
Do.	Celsa Manufacturing Ltd. (Grupo Celsa, 100%)	Tremorfa Works, Cardiff, South Glamorgan County, Wales	850
Stone, crushed	Hanson plc	90 quarries in various locations	70,000
Talc	Alex Sandison and Son Ltd.	Unst, Shetland Islands	15
Tin, ore	Baseresult Holdings Ltd.	South Crofty Mine, Cornwall County, England	NA [5]

NA Not available. -- Zero.

[1]May include historic, postal, or preserved counties instead of current regional governments, such as cities, county boroughs, or unitary authorities.

[2]Grinding plant only. Kilns closed in May 2006.

[3]Under construction.

[4]Remelt facilities.

[5]Mine has been on care and maintenance status (but open for tours) since operations were suspended in 1998. Redevelopment of the mine is underway.

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